ASSOCIATED DETAIL SPECIFICATION

MICROCIRCUITS, DIGITAL, CMOS, COUNTERS/DIVIDERS,
MONOLITHIC SILICON

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic silicon, CMOS counter/divider microcircuits. Two product assurance classes and a choice of case outline/lead finish are provided for each type and are reflected in the complete part number.

1.2 Part number. The complete part number shall be in accordance with MIL-M-38510.

1.2.1 Device type. The device type shall be as follows:

Device type	Circuit
01	Decade counter/divider
02	Presettable divide-by-"N" counter
03	14-stage ripple-carry binary counter/divider
04	Divide-by-8 counter/divider
05	7-stage binary counter
51	Decade counter/divider
52	Presettable divide-by-"N" counter
53	14-stage ripple-carry binary counter/divider
54	Divide-by-8 counter/divider
55	7-stage binary counter

1.2.2 Device class. The device class shall be the product assurance level as defined in MIL-M-38510.

1.2.3 Case outline. The case outline shall be designated as follows:

Letter	Case outline, MIL-M-38510, appendix C
A	F-1 (14-lead, 1/4" x 1/4"), flat-package
B	F-3 (14-lead, 3/16" x 1/4"), flat-package
C	D-1 (14-lead, 1/4" x 3/4"), dual-in-line package
D	F-2 (14-lead, 1/4" x 3/8"), flat-package
E	D-2 (16-lead, 1/4" x 7/8"), dual-in-line package
F	F-5 (16-lead, 1/4" x 3/8"), flat-package
N	F-5A (16-lead, 1/4" x 3/8"), flat package
T	F-2A (14-lead, 1/4" x 3/8"), flat package
X	F-1 (14-lead, 1/4" x 1/4"), flat-package except dimension "A" = 0.1 (2.54 mm), maximum
Y	F-2 (14-lead, 1/4" x 3/8"), flat-package except dimension "A" = 0.1 (2.54 mm), maximum
Z	F-5 (16-lead, 1/4" x 3/8"), flat-package except dimension "A" = 0.1 (2.54 mm), maximum

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: NASA Parts Project Office, Code 311.A, NASA/Goddard Space Flight Center, Greenbelt, Md 20771 by using the self-addressed Standardization Document Improvement (DD Form 1426) Proposal appearing at the end of this document or by letter.

NOTES

1. As an exception to nickel plate or undercoating paragraph of MIL-M-38510, for class outlines X, Y, and Z only, the leads of bottom brazed ceramic packages (i.e. configuration 2 of case outline F-1, F-2, or F-5) may have electroless nickel undercoating which shall be 50 to 200 microinches (1.27 to 5.08 µm) thick provided the lead finish is hot solder dip (i.e. finish letter A) and provided that, after any lead forming, an additional hot solder dip coating is applied which shall extend from the outer tip of the lead to no more than 0.015 inch (0.38 mm) from the package edge.

2. For bottom or side brazed packages, case outlines X, Y, and Z only, the S_1 dimension may go to .000 inch (.00 mm) minimum.

1.3 Absolute maximum ratings.

Supply voltage range (V_{DD} - V_{SS}):	
Device types 01, 02, 03, 04, and 05	-0.5 to +15.5 V dc
Device types 51, 52, 53, 54, and 55	-0.5 to +18 V dc
Input current (each input)	±10 mA
Input voltage range	(V_{SS} -0.5 V dc) ≤ V_I ≤ (V_{DD} +0.5 V dc)
Storage temperature range	-65°C to +175°C
Maximum power dissipation, (P_D)	+200 mW
Lead temperature (soldering 10 seconds)	+300°C
Thermal resistance, junction to case (θ_{JC})	(See MIL-M-38510, appendix C)
Junction temperature (T_J)	+175°C

1.4 Recommended operating conditions.

Supply voltage range (V_{CC} or V_{DD} - V_{SS}):	
Device types 01, 02, 03, 04, and 05	4.5 to 12.5 V dc
Device types 51, 52, 53, 54, and 55	4.5 to 15.0 V dc
Input low (V_{IL}) voltage range:	
Device types 01, 02, 03, 04, and 05	0 to 0.85 V dc @ V_{DD} = 5 V dc 0 to 2.0 V dc @ V_{DD} = 10 V dc 0 to 2.1 V dc @ V_{DD} = 12.5 V dc
Device types 51, 52, 53, 54, and 55	0 to 1.5 V dc @ V_{DD} = 5 V dc V_{OL} = 10% V_{DD} V_{OH} = 90% V_{DD} 0 to 2.0 V dc at V_{DD} = 10 V dc 0 to 4.0 V dc @ V_{DD} = 15 V dc
Input high (V_{IH}) voltage range:	
Device types 01, 02, 03, 04, and 05	3.95 to 5.0 V dc @ V_{DD} = 5 V dc 8 to 10 V dc @ V_{DD} = 10 V dc 10.0 to 12.5 V dc @ V_{DD} = 12.5 V dc
Device types 51, 52, 53, 54, and 55	3.5 to 5.0 V dc @ V_{DD} - 5 V dc V_{OL} = 10% V_{DD} V_{OH} = 90% V_{DD} 8 to 10.0 V dc @ V_{DD} = 10 V dc 11.0 to 15.0 V dc @ V_{DD} = 15 V dc
Ambient operating temperature range (T_A)	-55°C to 125°C
Load capacitance	50 pF maximum

2. APPLICABLE DOCUMENTS

2.1 Specification and standard. The following specification and standard form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATION

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

STANDARD

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of the specification and standard required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Associated detail specification. The individual item requirements shall be in accordance with MIL-M-38510, and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein. Although eutectic die bonding is preferred, epoxy die bonding may be performed. However, the resin used shall be Dupont 5504 Conductive Silver Paste, or equivalent, which is cured at 200°C ±10°C for a minimum of 2 hours. The use of equivalent epoxies or cure cycles shall be approved by the qualifying activity. Equivalency shall be demonstrated in data submitted to the qualifying activity for verification.

3.2.1 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.2 Logic diagrams and functional waveforms. The logic diagrams and functional waveforms shall be as specified on figure 2.

3.2.3 Truth tables and logic equations. The truth tables and logic equations shall be as specified on figure 3.

3.2.4 Schematic circuit. The schematic circuits shall be submitted to the preparing activity prior to inclusion of a manufacturer's device in this specification and shall be submitted to the qualifying activity and agent activity (DESC-ECS) as a prerequisite for qualification. All qualified manufacturers' schematics shall be maintained and available upon request.

3.2.5 Case outlines. The case outlines shall be as specified in 1.2.3.

3.3 Lead material and finish. Lead material and finish shall be in accordance with MIL-M-38510 and 6.4 herein.

3.4 Electrical performance characteristics. The electrical performance characteristics are as specified in table I, and apply over the full recommended case operating temperature range unless otherwise specified.

3.5 Electrical test requirements. The electrical test requirements for each device class shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table III. V_{IL} and V_{IH} testings require only a summary of attribute data.

3.6 Marking. Marking shall be in accordance with MIL-M-38510.

3.6.1 Total dose radiation hardness identifier. Total dose radiation hardness identifier shall be in accordance with MIL-M-38510 and as specified herein (see 4.5.5).

3.6.2 Serialization. All class S devices shall be serialized in accordance with MIL-M-38510.

3.6.3 Correctness of indexing and marking. All devices shall be subjected to the final electrical test in table II after part number marking, to verify that they are correctly indexed and identified by part number. Optionally, an approved electrical test may be devised especially for this requirement.

3.7 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 40 (see MIL-M-38510, appendix E).

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-M-38510 and methods 5005 and 5007 of MIL-STD-883, as applicable, except as modified herein.

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to qualification and quality conformance inspection. The following additional criteria shall apply:

a. Delete the sequence specified in initial (pre-burn-in) electrical parameters (3.1.10) through interim (post-burn-in) electrical parameters (3.1.14) and substitute limes 1 through 7 of table II herein.

b. Burn-in (method 1015 of MIL-STD-883).

(1) Static tests (test condition A) use circuit shown on figure 4 or equivalent. Ambient temperature shall be 125°C minimum. Test duration for each static test shall be 24 hours minimum for class S devices and in accordance with table I method 1015 for class B devices.

(2) Dynamic test (test condition D) use circuit shown on figure 5, or equivalent. Ambient temperature shall be 125°C minimum. Test duration shall be in accordance with table I method 1015.

c. Interim and final electrical parameters shall be as specified in table II herein.

d. For class S devices, post dynamic burn-in, or class B devices, post static burn-in, electrical parameter measurements may, at the manufacturer's option, be performed separately or included in the final electrical parameter measurements.

e. When device types 01 through 05 are qualified by extension (see 4.3.1), they shall be screened in accordance with the requirements for corresponding device types 51 through 55, respectively.

4.2.1 Percent defective allowable (PDA).

a. The PDA for class S devices shall be 5 percent for static burn-in and 5 percent for dynamic burn-in, based on the exact number of devices submitted to each separate burn-in.

b. Static burn-in I and II failures shall be cumulative for determining PDA.

c. The PDA for class B devices shall be in accordance with MIL-M-38510. Dynamic burn-in is not required.

d. Those devices whose measured characteristics, after burn-in, exceed the specified delta (Δ) limits or electrical parameter limits specified in table III, subgroup 1, are defective and shall be removed from the lot. The verified failures divided by the total number of devices in the lot initially submitted to burn-in shall be used to determine the percent defective for the lot and the lot shall be accepted or rejected based on the specified PDA.

4.3 Qualification inspection. Qualification inspection shall be in accordance with MIL-M-38510. Inspections to be performed shall be those specified in method 5005, of MIL-STD-883 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.5).

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ V_{SS} = 0 V, -55°C ≤ T_C ≤ 125°C, unless otherwise specified	Device type	Limits		Unit
				Min	Max	
Positive clamping input to V_{DD}	V_{IC} (POS)	T_C = 25°C, V_{DD} = GND, V_{SS} = Open, Output = Open, I_I = 1 mA	All		1.5	V
Negative clamping input to V_{SS}	V_{IC} (NEG)	T_C = 25°C, V_{DD} = Open, V_{SS} = GND, Output = Open, I_I = -1 mA	All		-6	V
Quiescent supply current	I_{SS}	V_{DD} maximum any combination of inputs	01,02,04, 05,51,52, 54,55		-5.0	µA
			03,53		-10.0	µA
High level output voltage	V_{OH}	V_{DD} = 12.5 V, no load, all outputs	01-05	11.25		V
		V_{DD} = 5.0 V, I_{OH} = -21 µA, decoded outputs	01,04	4.5		V
		V_{DD} = 5.0 V, I_{OH} = -105 µA carry output	01,04	4.5		V
		V_{DD} = 5.0 V, I_{OH} = -40 µA, Q_1 through Q_4 outputs	02	4.5		V
		V_{DD} = 5.0 V, I_{OH} = -105 µA, Q_5 output	02	4.5		V
		V_{DD} = 5.0 V, I_{OH} = -65 µA, all outputs	03	4.5		V
		V_{DD} = 5.0 V, I_{OH} = -105 µA, all outputs	05	4.5		V
		V_{DD} = 15 V, I_{OH} = 0	51-55	14.95		V
Low level output voltage	V_{OL}	V_{DD} = 12.5 V, no load, all outputs	01-05		1.25	V
		V_{DD} = 5.0 V, I_{OL} = 35 µA, decoded outputs	01,04		500	mV
		V_{DD} = 5.0 V, I_{OL} = 105 µA carry output	01,04		500	mV
		V_{DD} = 5.0 V, I_{OL} = 35 µA, Q_1 through Q_4 output	02		500	mV
		V_{DD} = 5.0 V, I_{OL} = 105 µA, Q_5 output	02		500	mV
		V_{DD} = 5.0 V, I_{OL} = 90 µA, all outputs	03		500	mV
		V_{DD} = 5.0 V, I_{OL} = 175 µA, all outputs	05		500	mV
		V_{DD} = 15 V, I_{OL} = 0	51-55		50	mV
Input high voltage	V_{IH}	V_{DD} = 5 V, see table III	01-05	3.6		V
		V_{DD} = 5 V, see table III	51-55	3.5		V

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ V_{SS} = 0 V, -55°C ≤ T_C ≤ 125°C, unless otherwise specified	Device type	Limits Min	Limits Max	Unit
Input high voltage	V_{IH}	V_{DD} = 10 V, see table III	01-55	7.0		V
		V_{DD} = 15 V, see table III	51-55	11.0		V
Input low voltage	V_{IL}	V_{DD} = 5 V, see table III	01-05		0.85	V
		V_{DD} = 5 V, see table III	51-55		1.5	V
		V_{DD} = 10 V, see table III	51-55		3.0	V
		V_{DD} = 15 V, see table III	51-55		4.0	V
Output low (sink) current	I_{OL}	V_{DD} = 5 V, V_{IN} = 0 V or 5 V, V_{OL} = 0.4 V	51-55	0.36		mA
		V_{DD} = 15 V, V_{IN} = 0 V or 15 V, V_{OL} = 1.5 V	51-55	2.4		mA
Output high (source) current	I_{OH}	V_{DD} = 5 V, V_{IN} = 0 V or 5 V, V_{OH} = 4.6 V	51-55	-0.36		mA
		V_{DD} = 15 V, V_{IN} = 0 V or 15 V, V_{OH} = 13.5 V	51-55	-2.4		mA
Input leakage current 2/	I_{IH}	Each input, V_{DD} = 15 V	01-05		45	nA
		Each input, V_{DD} = 18 V	51-55			
		Each input, V_{DD} = 15 V	01-05		-45	nA
		Each input, V_{DD} = 18 V	51-55			
Input test voltage	V_{ZAP}	C_1 = 100 pF, R_2 = 1.5 kΩ (see 4.5.3)	All	400		V
Input capacitance	C_I	V_{DD} = 0 V, f = 1 MHz, T_C = 25°C, any input	All		12	pF
Propagation delay time, high-to-low level	t_{PHL}	V_{DD} = 5.0 V, clock to decoded ouputs	01	.013	2.70	µs
			51	"	1.40	
		V_{DD} = 5.0 V, reset to decoded outputs 1-9	01	"	2.70	
			51	"	1.40	
		V_{DD} = 5.0 V, clock to carry ouput	01	"	2.18	
			51	"	1.12	
		V_{DD} = 5.0 V, clock to Q_5 output	02	"	2.18	
			52	"	980	ns
		V_{DD} = 5.0 V, clock to Q_1 - Q_4 outputs	02	"	2.70	µs
			52	"	980	ns
Propagation delay time high-to-low level low-to-high level	t_{PHL} t_{PLH}	V_{DD} = 5.0 V, clock to Q_1	03	"	1.34	µs
		Q_4		.052	5.25	
		Q_5		.065	6.68	
		Q_6		.078	8.03	
		Q_7		.091	9.30	
		Q_8		.104	10.65	
		Q_9		.117	12.15	
		Q_{10}		.130	13.35	
		Q_{11}		.143	14.85	
		Q_{12}		.156	16.05	
		Q_{13}		.169	17.40	
		Q_{14}		.182	18.75	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ V_{SS} = 0 V, -55°C ≤ T_C ≤ 125°C, unless otherwise specified	Device type	Limits Min	Limits Max	Unit
Propagation delay time, high-to-low level	t_{PHL}	V_{DD} = 5.0 V, reset to any output	03	.013	4.95	µs
			53	"	630	ns
		V_{DD} = 5.0 V, clock to carry output	04	"	1.80	µs
			54	"	1.16	
		V_{DD} = 5.0 V, clock to decoded outputs	04	"	3.38	
			54	"	1.40	
		V_{DD} = 5.0 V, reset to decoded outputs 1 - 7	04	"	1.80	
			54	"	1.40	
Propagation delay time, low-to-high level high-to-low level	t_{PLH} t_{PHL}	V_{DD} = 5.0 V, clock to Q_1	05	"	0.66	
		Q_2		.026	1.32	
		Q_3		.039	1.98	
		Q_4		.052	2.64	
		Q_5		.065	3.30	
		Q_6		.078	3.96	
		Q_7		.091	4.65	
		V_{DD} = 5.0 V, reset to any output	05	.013	2.25	µs
			55	13	490	ns
Propagation delay time, low-to-high level	t_{PLH}	V_{DD} = 5.0 V, clock to decoded outputs	01	.013	2.70	µs
			51	"	1.40	
		V_{DD} = 5.0 V, clock to carry output	01	"	2.18	
			51	"	1.12	
		V_{DD} = 5.0 V, reset to 0 output	01	"	2.70	
			51	"	1.40	
		V_{DD} = 5.0 V, reset to carry output	01	"	2.18	
			51		1.12	
		V_{DD} = 5.0 V, clock to Q_5 output	02	"	2.18	
		V_{DD} = 5.0 V, clock to Q_1 - Q_4 outputs	02	"	2.70	
		V_{DD} = 5.0 V, clock to Q_1 - Q_5 outputs	52	13	980	ns
		V_{DD} = 5.0 V, reset to Q_5 output	02	.013	2.70	µs
		V_{DD} = 5.0 V, reset to Q_1 - Q_4 outputs	02	.013	2.18	
		V_{DD} = 5.0 V, reset to Q_1 - Q_5 outputs	52	13	980	ns
Propagation delay time, high-to-low level low-to-high level	t_{PHL} t_{PLH}	V_{DD} = 5.0 V, clock to Q_1	53	.013	0.77	µs
		Q_4		.052	2.15	
		Q_5		.065	2.62	
		Q_6		.078	3.08	
		Q_7		.091	3.54	
		Q_8		.104	4.00	
		Q_9		.117	4.47	
		Q_{10}		.130	4.93	
		Q_{11}		.143	5.39	
		Q_{12}		.156	5.85	
		Q_{13}		.169	6.31	
		Q_{14}		.182	6.78	
Propagation delay time, low-to-high level	t_{PLH}	V_{DD} = 5.0 V, clock to carry output	04	.013	1.80	
			54	"	1.16	
		V_{DD} = 5.0 V, clock to decoded outputs	04	"	3.38	µs
			54	"	1.40	
		V_{DD} = 5.0 V, reset to 0 output	04	"	3.38	
			54	"	1.40	
		V_{DD} = 5.0 V, reset to carry output	04	"	1.80	
			54	"	1.12	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ V_{SS} = 0 V, $-55°C \leq T_C \leq 125°C$, unless otherwise specified	Device type	Limits Min	Limits Max	Unit
Propagation delay time, low-to-high level high-to-low level	t_{PLH} t_{PHL}	V_{DD} = 5.0 V, clock to Q_1	55	.013	0.49	µs
		Q_2		.026	0.77	
		Q_3		.039	1.05	
		Q_4		.052	1.33	
		Q_5		.055	1.61	
		Q_6		.078	1.89	
		Q_7		.097	2.17	
Transition time, high-to-low level = transition time, low-to-high level	t_{THL} t_{TLH}	V_{DD} = 5.0 V, carry output	01	10	825	ns
		decoded outputs	01	.010	3.38	µs
	t_{THL}	V_{DD} = 5.0 V, carry and decoded outputs	51,54	10	280	ns
	t_{TLH}	V_{DD} = 5.0 V, carry and decoded outputs	51,54	10	504	ns
	t_{THL} t_{TLH}	V_{DD} = 5.0 V, Q_5 output	02	10	825	ns
		$Q_1 - Q_4$ outputs	02	.010	3.38	µs
		$Q_1 - Q_5$ outputs	52	10	350	ns
		V_{DD} = 5.0 V, all outputs	03	.010	1.73	µs
			53	10	280	ns
	t_{THL}	V_{DD} = 5.0 V, carry output	04	"	750	ns
	$t_{TLH/HL}$	V_{DD} = 5.0 V, carry outputs	04	"	750	ns
	t_{TLH}	V_{DD} = 5.0 V, carry output	04	"	900	ns
	t_{THL}	V_{DD} = 5.0 V, all outputs	05	"	645	ns
			55	"	280	ns
	t_{TLH}	V_{DD} = 5.0 V, all outputs	05	"	1050	ns
			55	"	280	ns
Minimum setup time, high-to-low level	t_{SHL}	V_{DD} = 5.0 V, clock input to reset or clock enable (decoded outputs)	01		1125	ns
		V_{DD} = 5.0 V, clock input to clock enable (carry, decoded outputs)	51		336	ns
		V_{DD} = 5.0 V, clock input to reset or clock enable (carry output)	01		750	ns
		V_{DD} = 5.0 V, clock input to reset	51		560	ns
		V_{DD} = 5.0 V, clock input to reset or preset enable	02		1125	ns
			52		560	ns
		V_{DD} = 5.0 V, clock input to data line	02		750	ns
			52		280	ns
Minimum set-up time, low-to-high level	t_{SLH}	V_{DD} = 5.0 V, clock input to data line	02		750	ns
			52		280	ns
Minimum set-up time, high-to-low level	t_{SHL}	V_{DD} = 5.0 V, clock input to clock enable or reset	04		1125	ns
		V_{DD} = 5.0 V, clock input to clock enable	54		350	ns
		V_{DD} = 5.0 V, clock input to reset	54		560	ns
Minimum clock pulse width	t_{PH}	V_{DD} = 5.0 V V_{IH} = 5.0 V	01,02,04,		750	ns
			51		350	
			52		700	
			54		550	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ V_{SS} = 0 V, -55°C ≤ T_C ≤ 125°C, unless otherwise specified	Device type	Limits Min	Limits Max	Unit
Minimum data pulse width	t_{PH}	V_{DD} = 5.0 V V_{IH} = 5.0 V	03		750	ns
			53		470	
			05		450	
			55		280	
Minimum preset pulse width	t_{PH}	V_{DD} = 5.0 V V_{IH} = 5.0 V	02		750	ns
			52		560	
Minimum reset pulse width	t_{PH}	V_{DD} = 5.0 V V_{IH} = 5.0 V	01,02		750	ns
			51,52		560	
			04,54		560	
			05		975	
			03		2.7	µs
			53		630	ns
			55		490	
Maximum Clock frequency	f_{MAX}	V_{DD} = 5.0 V C_L = 50 pF	03	650		kHz
			01,02,04,	350		kHz
			51	1.43		MHz
			05,53,55	1.10		MHz
			52,54	0.71		MHz

1/ Complete terminal conditions shall be as specified in table III.
2/ Input current at one input node.

TABLE II. Burn-in and electrical test requirements for device classification.

Line no.	Applicable tests and MIL-STD-883 test methods	Class S device 1/				Class B device 1/			
		Ref. par.	Table 2/ III subgroups	Table 3/ IV delta limits	Test circuit figure	Ref. par.	Table 2/ III subgroups	Table 3/ IV delta limits	Test circuit figure
1	Interim electrical parameters method 5004		1				1		
2	Static burn-in I method 1015	4.2b 4.5.2			4				
3	Same as line 1		1	Δ					
4	Static burn-in II method 1015	4.2b 4.5.2			4	4.2b 4.5.2	4/		4
5	Same as line 1		1*	Δ		4.2d	1*	Δ	
6	Dynamic burn-in method 1015	4.2b 4.5.2			5				
7	Same as line 1	4.2d	1*	Δ					
8	Final electrical parameters method 5004		1*,2,3,7, 9				1*,2,3,7, 9		
9	Group A end point electrical parameters method 5005	4.4.1	1,2,3,4,7, 8,9,10,11			4.4.1	1,2,3,4,7, 9,10,11		
10	Group B end-point electrical parameters method 5005	4.4.2	1,2,3,7, 8,9,10,11	Δ					
11	Group C end-point electrical parameters method 5005					4.4.3	1,2,3	Δ	
12	Group D end-point electrical parameters method 5005	4.4.4	1,2,3			4.4.4	1,2,3		

1/ Blank spaces indicate tests are not applicable.

2/ (*) indicates PDA applies to subgroup 1 (see 4.2.1).

3/ (Δ) indicates delta limit shall be required in table III subgroup 1, where specified, and delta values shall be computed with reference to the previous interim electrical parameters.

4/ The device manufacturer may at his option either perform delta measurements or within 24 hours after burn-in (or removal of bias) perform the final electrical parameter measurements.

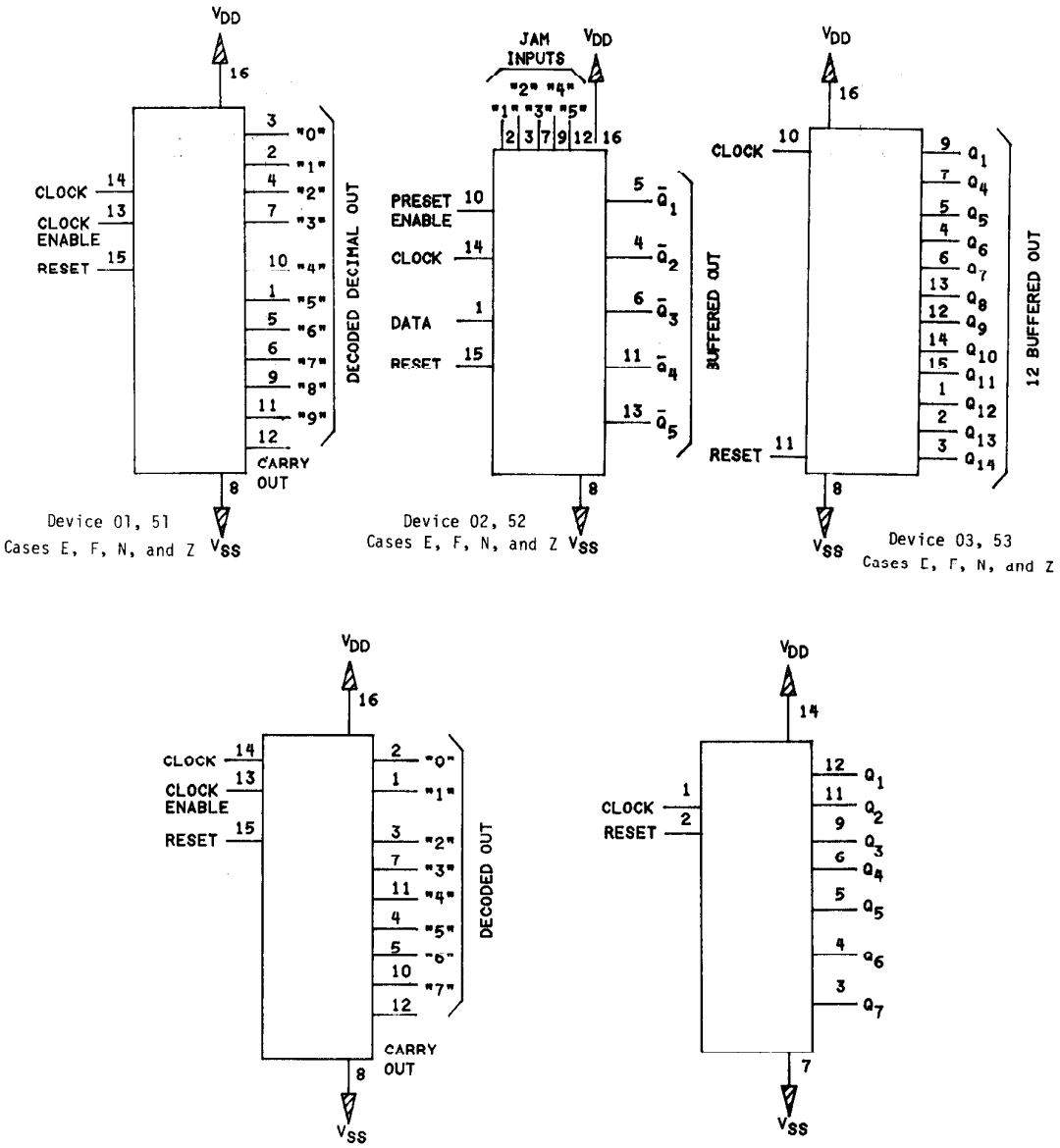
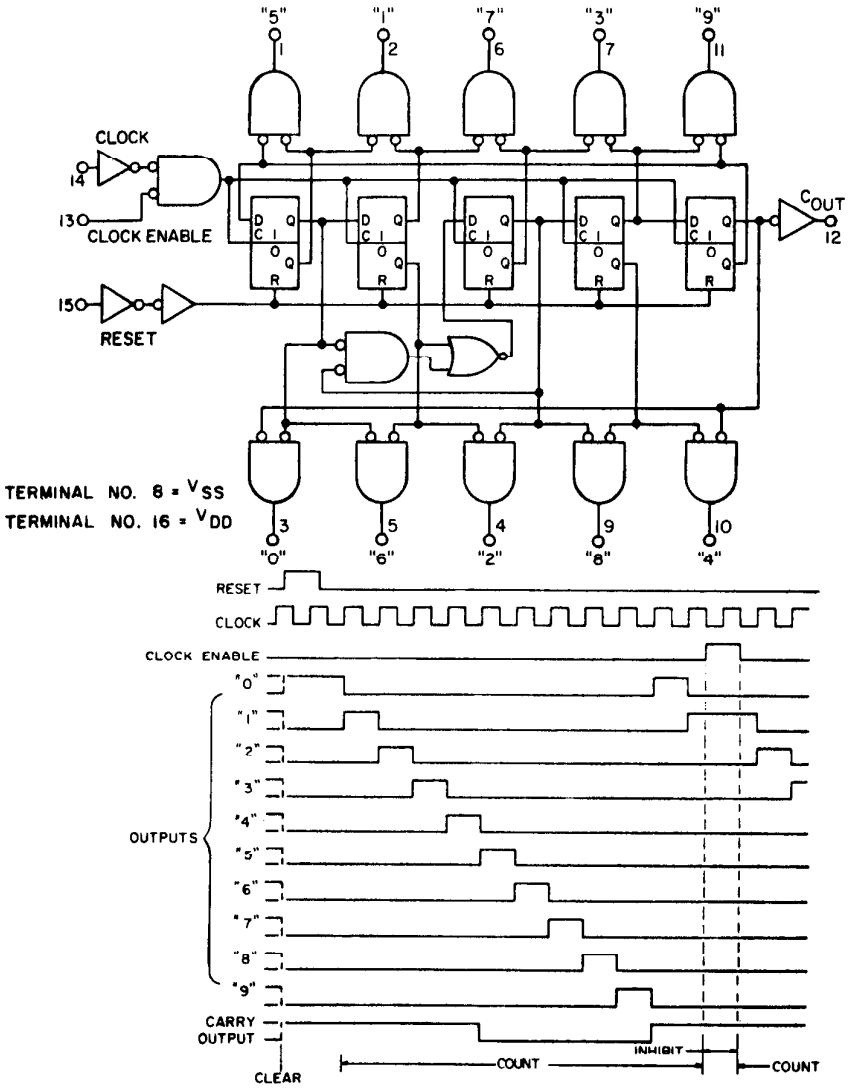
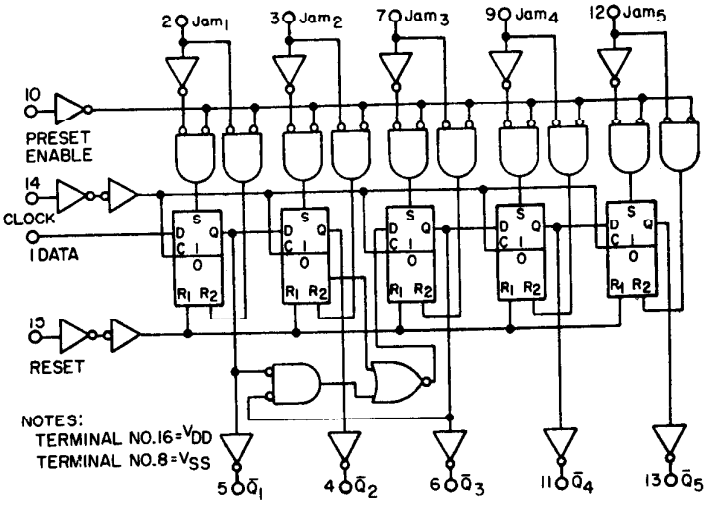


FIGURE 1. Terminal connections.

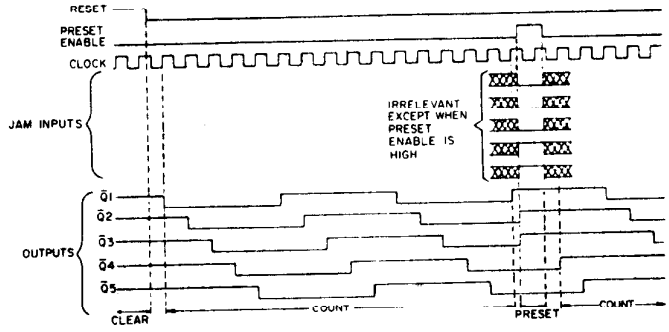


DEVICE 01, 51

FIGURE 2. Logic diagrams and functional waveforms.

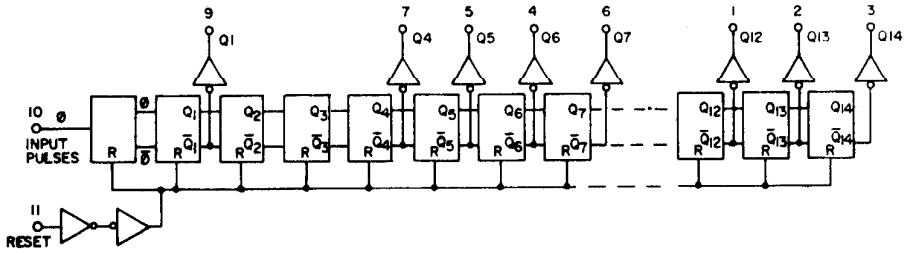


Shown in "divide by ten configuration," Q5 tied directly to DATA input.

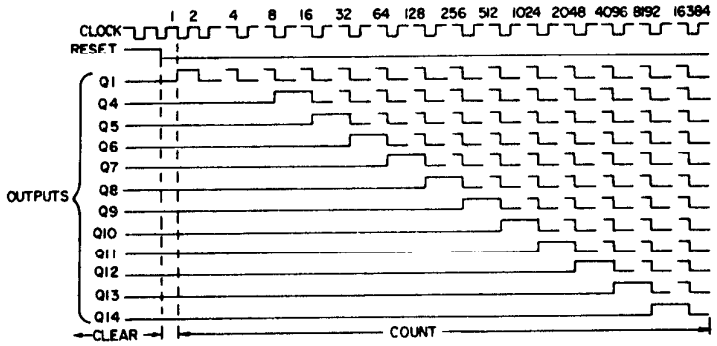


DEVICE 02, 52

FIGURE 2. Logic diagrams and functional waveforms - Continued.

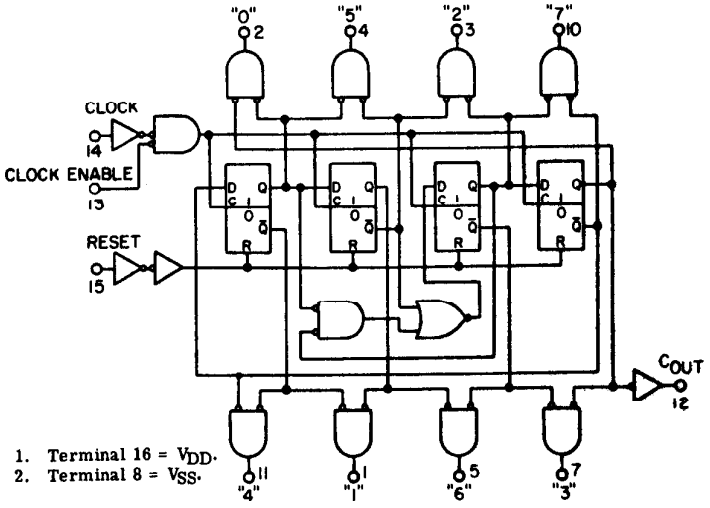


NOTES:
1. Terminal 16 = VDD.
2. Terminal 8 = VSS.

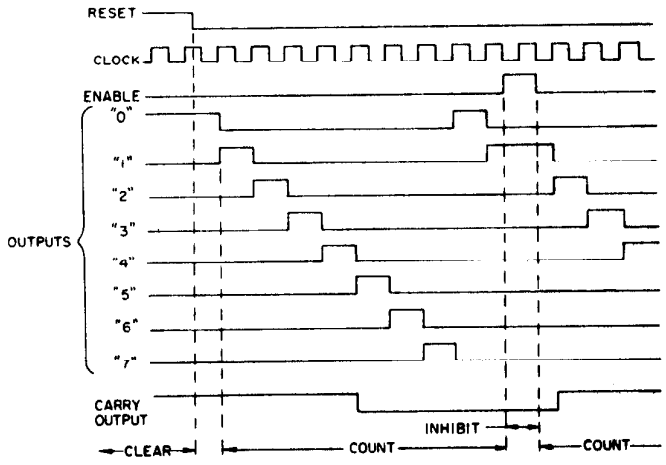


DEVICE 03, 53

FIGURE 2. Logic diagrams and functional waveforms - Continued.

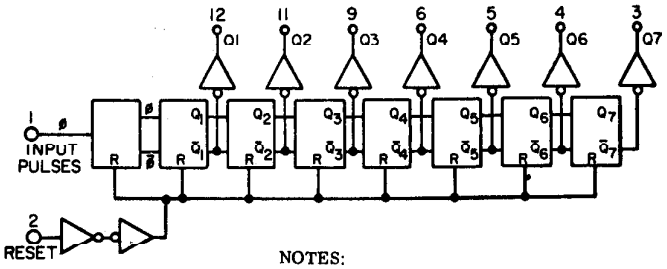


NOTES: 1. Terminal 16 = V_{DD}.
2. Terminal 8 = V_{SS}.

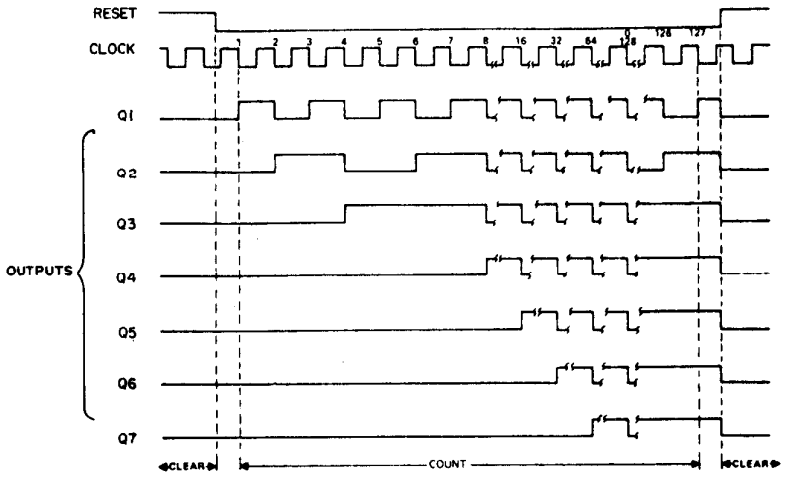


DEVICE TYPE 04, 54

FIGURE 2. Logic diagrams and functional waveforms - Continued.



NOTES:
1. Terminal 14 = V_{DD}.
2. Terminal 7 = V_{SS}.



DEVICE 05, 55

FIGURE 2. Logic diagrams and functional waveforms - Continued.

INPUTS				OUTPUTS			
Clock	Clock enable	Reset	D_{n-1}	Q_n	N_n	"O''_n	
X	H	L	X	$Q_{n\ 1}$	N_{n-1}	"O''_{n-1}	(No change)
X	X	H	X	L	L	H	
↘	X	L	X	Q_{n-1}	N_{n-1}	"O''_{n-1}	(No change)
↗	L	L	L	L	$N\text{-}1_{n-1}$	"$9''_{n-1}$	
↗	L	L	H	H	$N\text{-}1_{n-1}$	"$9''_{n-1}$	

On chip

N = any decoded output, "1" through "9" for device 01, 51 and "1" through "7" for device 04, 54.

Device 01, 04, 51, 54

INPUTS						OUTPUTS		
Clock	Reset	Data	Preset enable	Jam 1	Jam 2	$\overline{Q}1_n$	$\overline{Q}N_n$	
X	H	X	L	X	X	H	H	
X	H	X	H	X	X	Invalid condition		
X	L	X	H	L	L	H	H	
X	L	X	H	H	L	L	H	
X	L	X	H	L	H	H	L	
X	L	X	H	H	H	L	L	
↘	L	X	L	X	X	$\overline{Q}1_{n-1}$	$\overline{Q}N_{n-1}$	(No change)
↗	L	L	L	X	X	H	$\overline{Q}N\text{-}1_{n-1}$	
↗	L	H	L	X	X	L	$\overline{Q}N\text{-}1_{n-1}$	

N = any stage from 2 to 5.

Device 02, 52

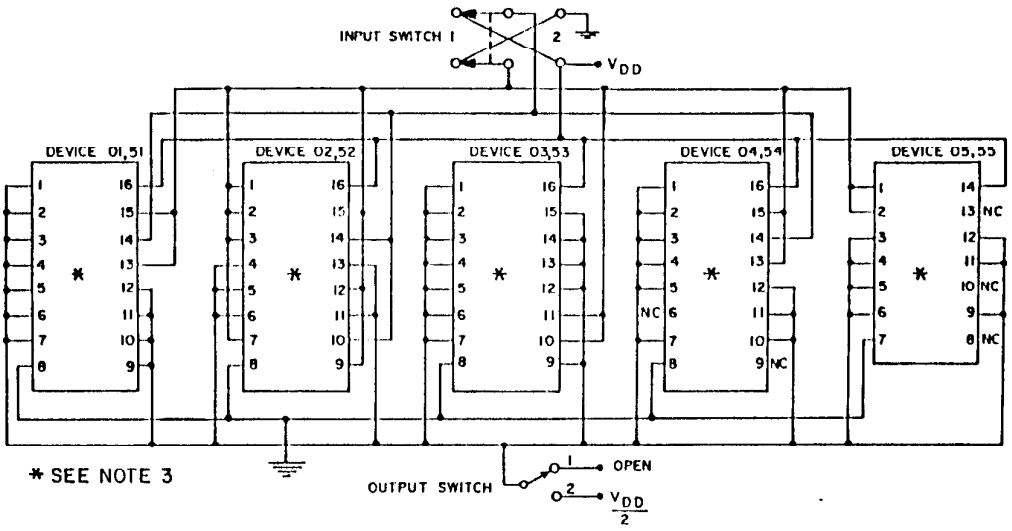
FIGURE 3. Truth tables.

DATA INPUT	RESET	OUTPUT STATE
L	L	No change
L	H	All outputs low
H	L	No change
H	H	All outputs low
↓	L	No change
↓	H	All outputs low
↑	L	Advance one count
↑	H	All outputs low

Device types 03, 05, 53 and 55

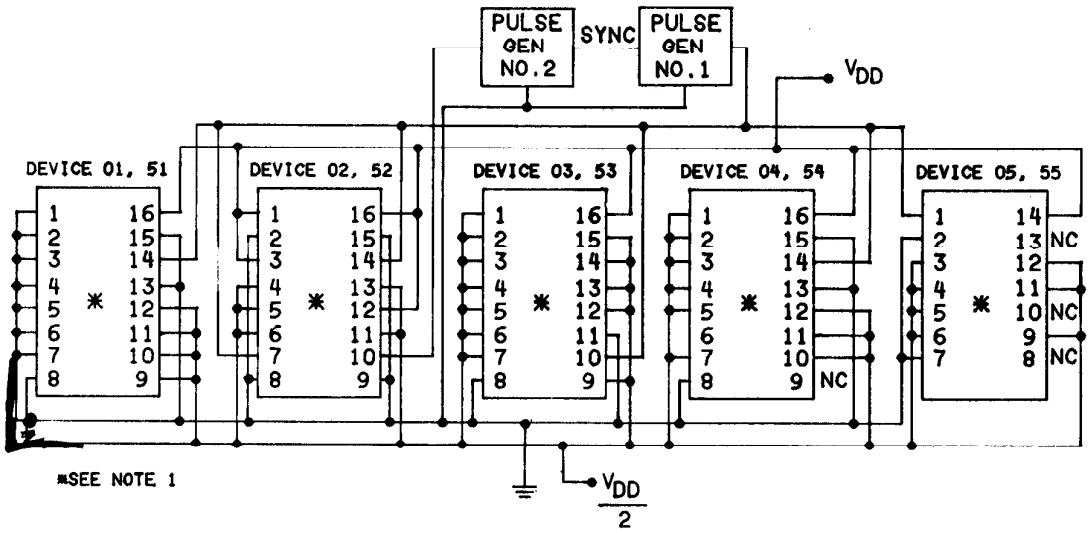
NOTES:
1. Positive logic.
2. X = don't care case.
3. ↓ = negative transition from time n-1 to n.
4. ↑ = positive transition from time n-1 to n.
5. n = 1, 2, 3, etc., and is the input/clock count after reset.

FIGURE 3. Truth tables - Continued.



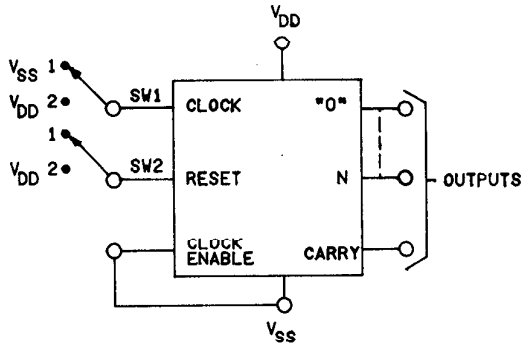
NOTES:
1. For static burn-in I, all inputs are connected to 0 volts, switch position 1.
2. For static burn-in II, all inputs are connected to V_{DD}, switch position 2.
3. Except for V_{DD} and V_{SS}, terminal shall be connected through resistors of 2 kΩ to 47 kΩ. The actual measured value of the resistor selected shall not exceed ±20 percent of its branded value due to use, heat or age.
4. Output may be in switch position 1 or 2.
5. V_{DD} = 12.5 V minimum, 15.0 V maximum for device 01, 02, 03, and 04.
   V_{DD} = 15.0 V minimum, 18.0 V maximum for device 51, 52, 53, and 54.
   $V_{DD/2} = V_{DD}/2$ ±1.0 V.
   V_{SS} = 0.0 V.

FIGURE 4. Static burn-in test circuit.

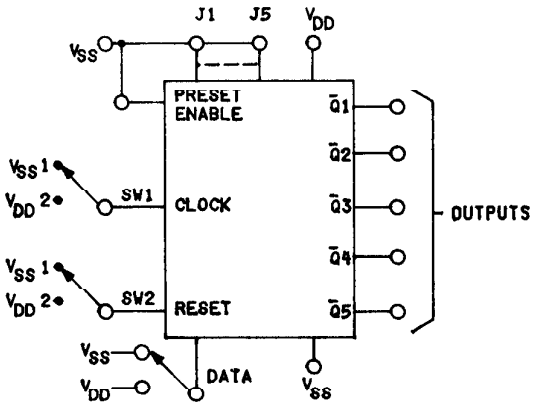


NOTES:
1. Except for V_{DD} and V_{SS}, terminal shall be connected through resistors of 2 kΩ to 47 kΩ. The actual measured value of the resistor selected shall not exceed ±20% of its branded value due to use, heat or age.
2. Input signal requirements:
   a. Square wave, 50% duty cycle.
   b. 25 kHz < PRR < 1 MHz.
   c. T_{TLH} and t_{THL} < 1 µs.
   d. Voltage level:
      Minimum = V_{SS} -0.5 V, +10% V_{DD}.
      Maximum = V_{DD} +0.5, -10% V_{DD}.
3. V_{DD} = 12.5 V minimum, 15.0 V maximum for device 01, 02, 03, and 04.
   V_{DD} = 15.0 V minimum, 18.0 V maximum for device 51, 52, 53, and 54.
   $V_{DD/2}$ = $V_{DD/2}$ ±1.0 V.
   V_{SS} = 0.0 V.

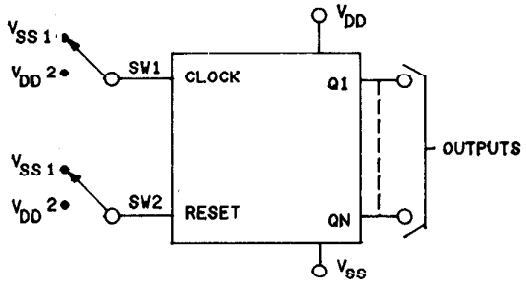
FIGURE 5. Dynamic burn-in and operating life test circuit.



Device 01, 04, 51, 54



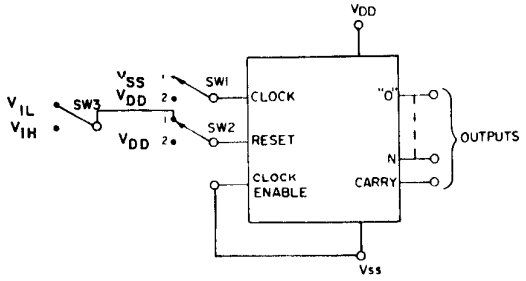
Device 02, 52



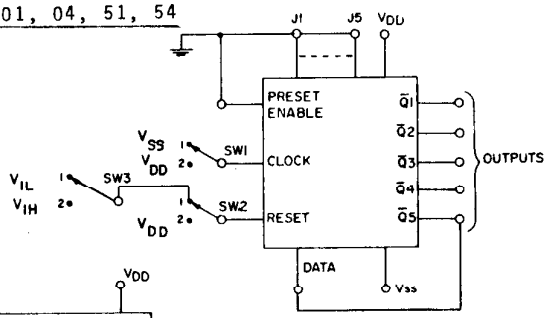
Device 03, 05, 53, 55

NOTES:
1. Each output shall be measured as specified in table III.
2. For device types 01 through 05 the input-output voltage subscript numbers (V_{IH1}, V_{OH1}, etc.) are matched for each test. Each applicable load current is specified in table III.
3. See figure 2 for logic diagram and functional waveform.
4. To step counter through its sequence, momentarily place SW2 in position 2, then with SW1 increment counter to the correct output logic state for measurements. Set device type 02 DATA input high or low to achieve correct input.

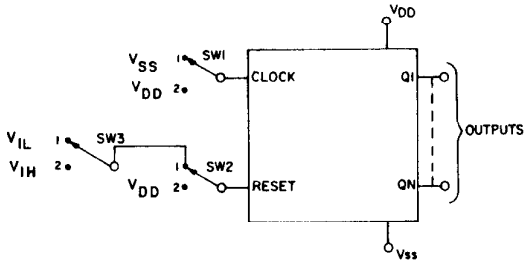
FIGURE 6. Test procedures and test circuits for output voltage and current measurements.



Device 01, 04, 51, 54



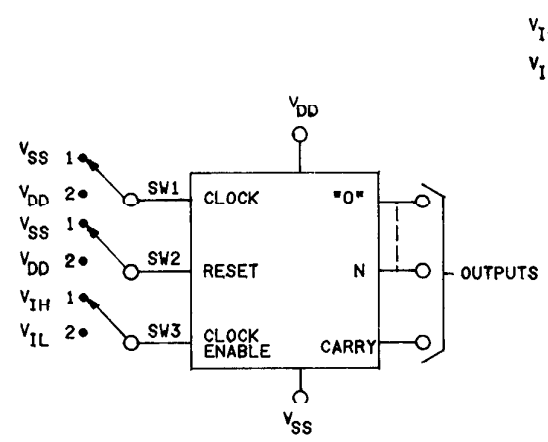
Device 02, 52



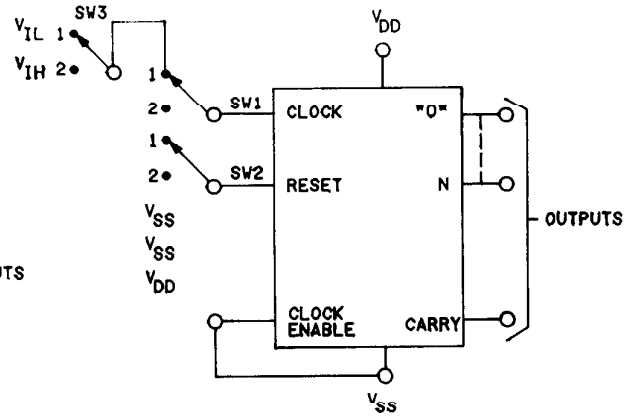
Device 03, 05, 53, 55

NOTES:
1. All outputs shall be checked for proper operation as specified in table III.
2. To step counter through its sequence, momentarily place SW2 in position 2, then with SW3 in the required logic position, toggle SW1 to increment counter.
3. See figure 2 for logic diagram and functional waveform.
4. Test requirements are considered met if counter returns to its zero count whenever SW3 is momentarily placed in position 2. Further, when SW3 is in position 2, counter will not advance but advances when SW3 is in position 1.

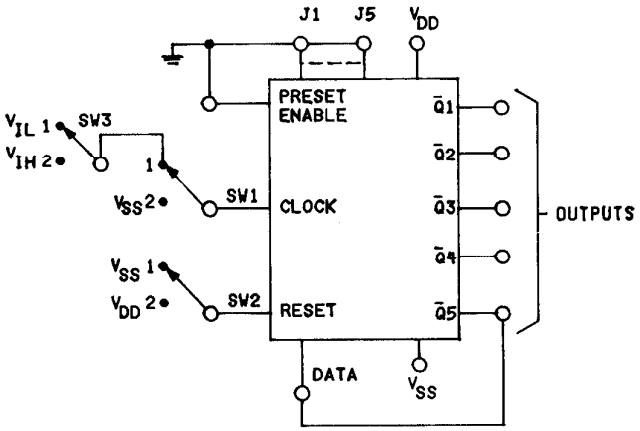
FIGURE 7. Test procedure and test circuits for RESET input voltage tests.



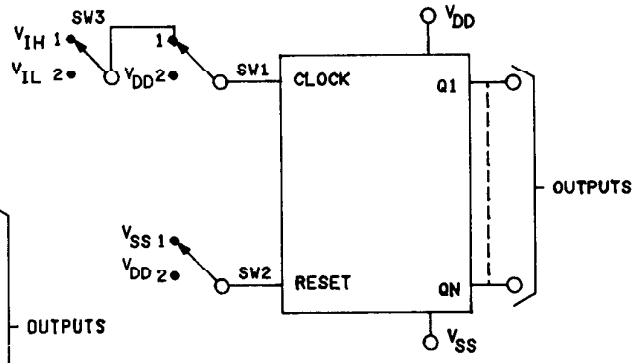
Device 01, 04, 51, 54



Device 01, 04, 51, 54



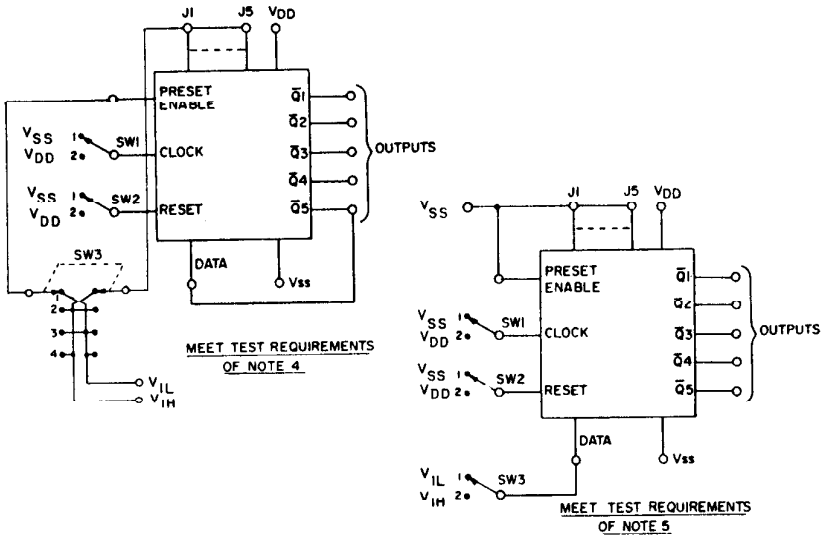
Device 02, 52



Device 03, 05, 53, 55

NOTES:
1. All outputs shall be checked for proper operation as specified in table III.
2. To step counter through its sequence, momentarily place SW2 in position 2, then with SW3 in the required logic position, toggle SW1 to increment counter.
3. See figure 2 for logic diagram and functional waveform.
4. Test requirements are considered met, if counter advances when SW3 is in position 2 but does not advance when SW3 is in position 1.

FIGURE 8. Test procedure and test circuits for CLOCK and CLOCK ENABLE input voltage tests.



Device 02, 52

NOTES:
1. All outputs shall be checked for proper operation as specified in table III.
2. To step counter through its sequence, momentarily place SW2 in position 2, then with SW3 in the required logic position, toggle SW1 to increment counter.
3. See figure 2 for logic diagram and functional waveform.
4. Test requirements are considered met if: (a) counter advances with SW3 in positions 1 and 3, (b) all counter outputs are logic "L" with SW3 in position 2, and (c) all counter outputs are logic "H" with SW3 in position 4.
5. Test requirements are considered met if, with SW3 in position 1, the counter advances to a full count during 5 clock periods with outputs achieving logic "H". At this point, SW3 is changed to position 2 and after 5 more clock periods a full count shall be registered with outputs achieving logic "L".

FIGURE 9. Test procedures and test circuits for JAM, PRESET ENABLE, and DATA input voltage tests.

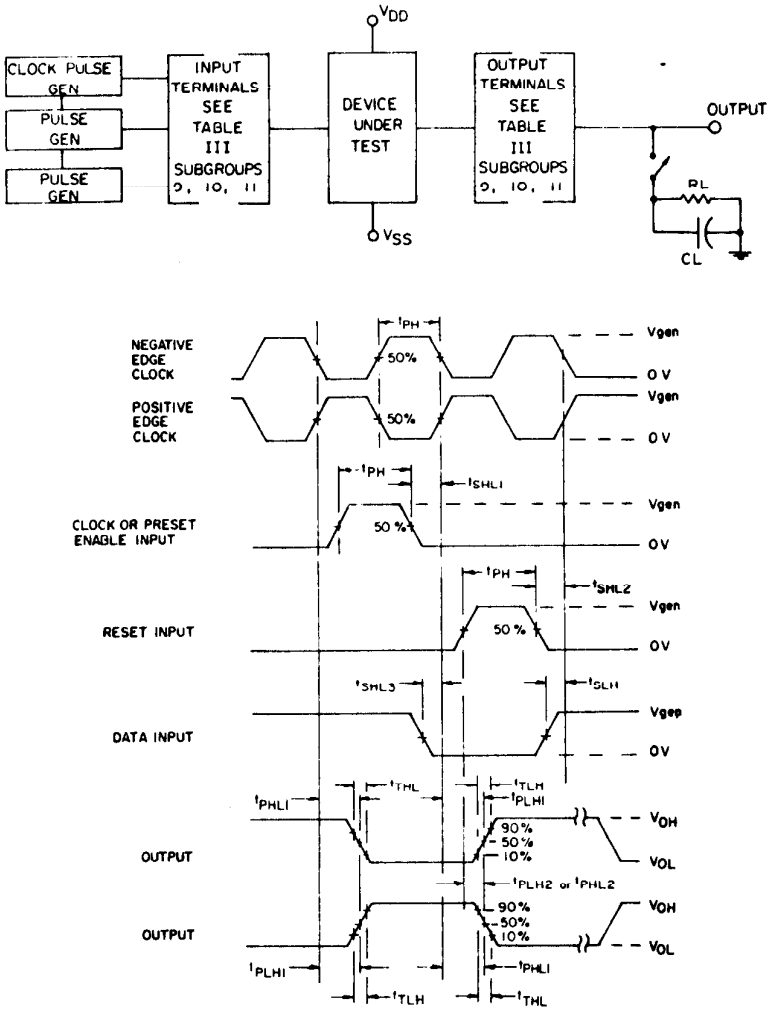


FIGURE 10. Switching time waveforms and test circuit.

Test	Input terminal	Device type	Generator pulse conditions								Load	
			V_{GEN}	PRR at °C		t_{THL}	t_{TLH}	Duty cycle	t_{PH} at °C		R_L kΩ	C_L
				25, -55	125	≤	≤	%	25, -55 ≤	125 ≤	±10%	pF
t_{PLH}, t_{PHL} Clock to Output	Clock *	01, 02, 04	5.0 V	450 kHz	350 kHz	15 ns	15 ns	50			200	50
		52, 54	5.0 V	995 kHz	710 kHz	15 ns	15 ns	50			200	50
		03	5.0 V	850 kHz	650 kHz	15 ns	15 ns	50			200	50
		51	5.0 V	2.0 MHz	1.43 MHz	15 ns	15 ns	50			200	50
		53, 05, 55	5.0 V	1.5 MHz	1.1 MHz	15 ns	15 ns	50			200	50
t_{PLH} t_{PHL} Reset to output	Reset*	01, 02	5.0 V			30 ns	30 ns		500 ns	750 ns	200	50
	Clock	01, 02	5.0 V			15 ns	15 ns		500 ns	750 ns	200	50
	Reset*	03	5.0 V			30 ns	30 ns		1.8 µs	2.7 µs	200	50
	Clock	03	5.0 V			15 ns	15 ns		500 ns	750 ns	200	50
	Reset*	04	5.0 V			30 ns	30 ns		400 ns	560 ns	200	50
	Clock	04	5.0 V			15 ns	15 ns		500 ns	750 ns	200	50
	Reset*	05	5.0 V			30 ns	30 ns		650 ns	975 ns	200	50
	Clock	05	5.0 V			15 ns	15 ns		300 ns	450 ns	200	50
	Reset*	51, 54	5.0 V			30 ns	30 ns		400 ns	560 ns	200	50
	Clock	51, 54	5.0 V			15 ns	15 ns		250 ns	350 ns	200	50
	Reset*	52	5.0 V			30 ns	30 ns		400 ns	560 ns	200	50
	Clock	52	5.0 V			15 ns	15 ns		500 ns	700 ns	200	50
	Reset*	53	5.0 V			30 ns	30 ns		450 ns	630 ns	200	50
	Clock	53	5.0 V			15 ns	15 ns		335 ns	470 ns	200	50
	Reset*	55	5.0 V			30 ns	30 ns		350 ns	490 ns	200	50
	Clock	55	5.0 V			15 ns	15 ns		200 ns	280 ns	200	50

FIGURE 10. Switching time waveforms and test circuit - Continued.

Test	Input terminal	Device type	Generator pulse conditions							Load	
			V_{GEN}	PRR at °C		t_{THL} ≤	t_{TLH} ≤	Duty cycle %	t_{PH} at °C		R_L kΩ ±10%	C_L pF
				25, -55	125				25, -55 ≤	125 ≤		
t_{SHL} t_{SLH} Input to clock	Clock	51	5.0 V	1.876 MHz	1.34 MHz	15 ns	15 ns	50				
	Clock	54	5.0 V	995 kHz	710 kHz	15 ns	15 ns	50				
	Reset or * Clock ENABLE	01, 04 51, 54	5.0 V			15 ns			1.0 µs min	1.0 µs min		
	Clock	01, 04	5.0 V	450 kHz	350 kHz	15 ns	15 ns	50				
	Reset or * Clock ENABLE	02, 52	5.0 V			30 ns			1.0 µs min	1.0 µs min		
	Clock	02	5.0 V	450 kHz	350 kHz	15 ns	15 ns	50				
		52	5.0 V	995 kHz	710 kHz	15 ns	15 ns	50				
	Data*	52	5.0 V	834 kHz	595 kHz	15 ns	15 ns	50				
		02	5.0 V	225 kHz	175 kHz	15 ns	15 ns	50				
	Reset	02, 52	5.0 V			30 ns	30 ns					
	Clock	52	5.0 V	995 kHz	710 kHz	15 ns	15 ns	50	1.0 µs min	1.0 µs min		
		02	5.0 V	450 kHz	350 kHz	15 ns	15 ns	50				

FIGURE 10. Switching time waveforms and test circuit - Continued.

NOTES:
1. Test conditions grouped by double horizontal lines are simultaneously applicable to the test being performed.
2. Unless otherwise specified, test each output separately.
3. "CL" conditions include probe and wiring capacitance.
4. Apply input pulses as shown in abbreviated waveforms. See figure 2 for complete functional waveforms.
5. Setup times (t_{SHL} and t_{SLH}) are set to the maximum values given in the test limits columns of table III. Setup time test requirements are considered met if counters advance on the next actuating transition of the clock pulse following the negative transition of the reset, clock enable, or preset enable pulse. Device types 02, ~~52~~ "data" of the "data" input logic level with the next positive transition of the clock pulse after a "data" input logic change.
6. For device types 02 and ~~52~~, the "$\overline{Q5}$" output is connected to the "data" input in all switching time test except the "data" setup time test.
7. The inputs marked with an asterisk designate the measured terminal.
8. Duty cycle and PRR, although not relevant for real-time measurements, are sepcified to accommodate other measurement techniques.

FIGURE 10. Switching time waveforms and test circuit - Continued.

TABLE III. Group A inspection for cevice type 01.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions 4/																Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_C = 25°C		Subgroup 2 T_C = 125°C		Subgroup 3 T_C = -55°C		
		Test no.	5 OUT	1 OUT	0 OUT	2 OUT	6 OUT	7 OUT	3 OUT	V_{SS}	8 OUT	4 OUT	9 OUT	CARRY OUT	CLOCK ENABLE	CLOCK	RESET	V_{DD}		Min	Max	Min	Max	Min	Max	
V_{IC} (V_{OS})		1													1 mA	1 mA	1 mA	GND	EACH INPUT		1.5					V
V_{IC} (NEG)		2								GND					-1 mA	-1 mA	-1 mA		EACH INPUT		-6.0					V
I_{IL1} 6/	3009	3								"					GND	GND	GND	15.0 V	ALL INPUTS TOGITHER		-3.0					nA
I_{IL2}	3009	4								"					GND	GND	GND	"	EACH INPUT		-1.0		-45.0			"
I_{IH1}	3010	5								"					15.0 V	15.0 V	15.0 V	"	ALL INPUTS TOGITHER		3.0					"
I_{IH2}	3010	6								"					15.0 V	15.0 V	15.0 V	"	EACH INPUT		1.0		45.0			"
V_{OH1} 1/2/	3006	7	I_{OH1}	I_{OH1}	I_{OH1}	I_{OH1}	I_{OH1}	I_{OH1}	I_{OH1}	"	I_{OH1}	I_{OH1}	I_{OH1}	I_{OH2}	IN	IN	IN	5.0 V	EACH OUTPUT	4.5		4.5		4.5		V
V_{OL1}	3007	8	I_{OL1}	I_{OL1}	I_{OL1}	I_{OL1}	I_{OL1}	I_{OL1}	I_{OL1}	"	I_{OL1}	I_{OL1}	I_{OL1}	I_{OL2}	"	"	"	5.0 V	EACH OUTPUT		500		500		500	mV
V_{OH2}	3006	9	OUT	OUT	OUT	OUT	OUT	OUT	OUT	"	OUT	OUT	OUT	OUT	"	"	"	12.5 V	EACH OUTPUT	11.25		11.25		11.25		V
V_{OL2}	3007	10	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	12.5 V	EACH OUTPUT		1.25		1.25		1.25	"
V_{IL} 1/2/	Fig 8	11	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	5.0 V	CLOCK ENABLE	1.10		0.85		1.35		"
V_{IH}	"	12	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	CLOCK ENABLE		3.80		3.50		3.95	"
V_{IL}	"	13	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	CLOCK	1.10		0.85		1.35		"
V_{IH}	"	14	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	CLOCK		3.80		3.50		3.95	"
V_{IL}	Fig 7	15	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	RESET	1.10		0.85		1.35		"
V_{IH}	Fig 7	16	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	RESET		3.80		3.50		3.95	"
I_{SS} 3/	3005	17								"					GND	GND	15.0 V	15.0 V	V_{SS}		-0.5		-5.0			µA
	"	18								"					"	GND	GND	"	V_{SS}		"		"			"
	"	19								"					"	15.0 V	"	"	None		"		"			"
	"	20								"					"	GND	"	"	V_{SS}		"		"			"
	"	21								"					"	15.0 V	"	"	None		"		"			"
	"	22								"					"	GND	"	"	V_{SS}		"		"			"
	"	23								"					"	15.0 V	"	"	None		"		"			"
	"	24								"					"	GND	"	"	V_{SS}		"		"			"
	"	25								"					"	15.0 V	"	"	None		"		"			"
	"	26								"					"	GND	"	"	V_{SS}		"		"			"
	"	27								"					"	15.0 V	"	"	None		"		"			"
	"	28								"					"	GND	"	"	V_{SS}		"		"			"
	"	29								"					"	15.0 V	"	"	None		"		"			"
	"	30								"					"	GND	"	"	V_{SS}		"		"			"
	"	31								"					"	15.0 V	"	"	None		"		"			"
	"	32								"					"	GND	"	"	V_{SS}		"		"			"
	"	33								"					"	15.0 V	"	"	None		"		"			"
	"	34								"					"	GND	"	"	V_{SS}		"		"			"
	"	35								"					"	15.0 V	"	"	None		"		"			"
	"	36								"					15.0 V	15.0 V	"	"	V_{SS}		"		"			"

See footnotes at end of device type 05.

TABLE III. Group A inspection for device type 01 - Continued.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions 4/																Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 4 T_C = 25°C						
		Test no.	5 OUT	1 OUT	0 OUT	2 OUT	6 OUT	7 OUT	3 OUT	V_{SS}	8 OUT	4 OUT	9 OUT	CARRY OUT	CLOCK ENABLE	CLOCK	RESET	V_{DD}		Min	Max	Min	Max	Min	Max	
C_i 2/	3012	37							GND						IN	IN	IN	GND	EACH INPUT		12.0					pF
																				Subgroup 7 T_C = 25°C		Subgroup 8 T_C = 125°C		T_C = -55°C		
																				Min	Max	Min	Max	Min	Max	
3/	3014	38	L	L	H	L	L	L	L	GND	L	L	L	H	GND	5.0 V	5.0 V	5.0 V	EACH OUTPUT							
	"	39	L	L	H	L	L	L	L	"	L	L	L	H	"	5.0 V	GND	5.0 V	"							
	"	40	L	H	L	L	L	L	L	"	L	L	L	H	"	PA	"	"	"							
	"	41	L	L	L	H	L	L	L	"	L	L	L	H	"	"	"	"	"							
	"	42	L	L	L	L	L	L	H	"	L	L	L	H	"	"	"	"	"							
	"	43	L	L	L	L	L	L	L	"	L	H	L	H	"	"	"	"	"							
	"	44	H	L	L	L	L	L	L	"	L	L	L	L	"	"	"	"	"							
	"	45	L	L	L	L	H	L	L	"	L	L	L	L	"	"	"	"	"							
	"	46	L	L	L	L	L	H	L	"	L	L	L	L	"	"	"	"	"							
	"	47	L	L	L	L	L	L	L	"	H	L	L	L	"	"	"	"	"							
	"	48	L	L	L	L	L	L	L	"	L	L	H	L	"	"	"	"	"							
	"	49	L	L	H	L	L	L	L	"	L	L	L	H	"	"	"	"	"							
	"	50	L	H	L	L	L	L	L	"	L	L	L	H	"	"	"	"	"							
	"	51	L	H	L	L	L	L	L	"	L	L	L	H	5.0 V	5.0 V	"	"	"							
	"	52	L	H	L	L	L	L	L	"	L	L	L	H	5.0 V	PA	"	"	"							
	"	53	L	L	L	H	L	L	L	"	L	L	L	H	GND	5.0 V	"	"	"							
	"	54	X	X	X	X	X	X	X	"	X	X	X	X	"	PC	"	"	"							
	"	55	H	L	L	L	L	L	L	"	L	L	L	L	"	5.0 V	"	"	"							
	"	56	H	L	L	L	L	L	L	"	L	L	L	L	"	GND	"	"	"							
	"	57	L	L	H	L	L	L	L	"	L	L	L	H	"	GND	5.0 V	"	"							
	"	58	L	L	H	L	L	L	L	"	L	L	L	H	"	GND	GND	"	"							
	"	59	L	H	L	L	L	L	L	"	L	L	L	H	"	5.0 V	"	"	"							
	"	60	X	X	X	X	X	X	X	"	X	X	X	X	"	PD	"	"	"							
	"	61	H	L	L	L	L	L	L	"	L	L	L	L	"	5.0 V	"	"	"							
	"	62	L	L	H	L	L	L	L	"	L	L	L	H	"	5.0 V	5.0 V	"	"							
	"	63	L	L	H	L	L	L	L	"	L	L	L	H	"	5.0 V	GND	"	"							
																				Subgroup 9 T_C = 25°C		Subgroup 10 T_C = 125°C		Subgroup 11 T_C = -55°C		
																				Min	Max	Min	Max	Min	Max	
t_{PHL1}	3003	64								GND				OUT	GND	IN	GND	5.0 V	CLOCK TO	.013	1.45	.018	2.18	.013	1.45	µs
t_{PHL1} 1/2/	"	65	OUT	OUT	OUT	OUT	OUT	OUT	OUT	"	OUT	OUT	OUT		"	"	GND	"	OUTPUT	"	1.80	"	2.70	"	1.80	"
t_{PLH1}	"	66								"				OUT	"	"	GND	"	CLOCK TO	"	1.45	"	2.18	"	1.45	"
t_{PLH1}	"	67	OUT	OUT	OUT	OUT	OUT	OUT	OUT	"	OUT	OUT	OUT		"	"	GND	"	OUTPUT	"	1.80	"	2.70	"	1.80	"
t_{PLH2}	"	68			OUT					"					"	"	IN	"	RESET TO	"	1.80	"	2.70	"	1.80	"
t_{PLH2}	"	69								"				OUT	"	"	"	"	OUTPUT	"	1.45	"	2.18	"	1.45	"
t_{PHL2}	"	70	OUT	OUT		OUT	OUT	OUT	OUT	"	OUT	OUT	OUT		"	"	"	"	RESET TO OUTPUT	"	1.80	"	2.70	"	1.80	"
t_{THL}	3004	71								"				OUT	"	"	GND	"	OUTPUT	10	550	14	825	10	550	ns
t_{THL}		72	OUT	OUT	OUT	OUT	OUT	OUT	OUT	"	OUT	OUT	OUT			"	"	"	OUTPUT	.010	2.25	.014	3.38	.010	2.25	µs
t_{TLH}	3004	73								"				OUT		"	"	"	OUTPUT	10	550	14	825	10	550	ns
t_{TLH}		74	OUT	OUT	OUT	OUT	OUT	OUT	OUT	"	OUT	OUT	OUT			"	"	"	OUTPUT	.010	2.25	.014	3.38	.010	2.25	µs
t_{SHL1} 2/		75								"				OUT	IN	"	"	"	CLOCK ENABLE TO CLOCK		500		750		500	ns
t_{SHL1}		76	OUT	OUT	OUT	OUT	OUT	OUT	OUT	"	OUT	OUT	OUT		IN	"	"	"	CLOCK ENABLE TO CLOCK		750		1125		750	ns
t_{SHL2}		77			OUT					"					GND	"	IN	"	RESET TO CLOCK		750		1125		750	ns

See footnotes at end of device type 05.

TABLE III. Group A inspection for device type 02.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions 4/																Measured terminal	Limits					Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_C = 25°C		Subgroup 2 T_C = 125°C		Subgroup 3 T_C = -55°C	
		Test no.	DATA	JAM 1	JAM 2	Q2	Q1	Q3	JAM 3	V_{SS}	JAM 4	RESET ENABLE	Q4	JAM 5	Q5	CLOCK	RESET	V_{DD}		Min	Max	Min	Max	Min	Max	
V_{IC} (POS)		1	1 mA	1 mA	1 mA				1 mA		1 mA	1 mA		1 mA		1 mA	1 mA	GND	EACH INPUT		1.5					V
V_{IC} (NEG)		2	-1 mA	-1 mA	-1 mA				-1 mA	GND	-1 mA	-1 mA		-1 mA		-1 mA	-1 mA		EACH INPUT		-6.0					V
I_{IL1} 6/	3009	3	GND	GND	GND				GND	GND	GND	GND		GND		GND	GND	15.0 V	ALL INPUTS TOGETHER		-9.0					nA
I_{IL2}	3009	4	GND	GND	GND				GND		GND	GND		GND		GND	GND		EACH INPUT		-1.0		-45.0			"
I_{IH1}	3010	5	15.0 V	15.0 V	15.0 V				15.0 V		15.0 V	15.0 V		15.0 V		15.0 V	15.0 V		ALL INPUTS TOGETHER		9.0					"
I_{IH2}	3010	6	15.0 V	15.0 V	15.0 V				15.0 V		15.0 V	15.0 V		15.0 V		15.0 V	15.0 V		EACH INPUT		1.0		45.0			"
V_{OH1} 1/2/	3006	7	IN	GND	GND	I_{OH3}	I_{OH3}	I_{OH3}	GND		GND	GND	I_{OH3}	GND	I_{OH2}	IN	IN	5.0 V	EACH OUTPUT	4.5		4.5		4.5		V
V_{OL1}	3007	8	"	"	"	I_{OL1}	I_{OL1}	I_{OL1}	"	"	"	"	I_{OL1}	"	I_{OL2}	"	"	5.0 V	EACH OUTPUT		500		500		500	mV
V_{OH2}	3006	9	"	"	"	OUT	OUT	OUT	"	"	"	"	OUT	"	OUT	"	"	2.5 V	EACH OUTPUT	11.25		11.25		11.25		V
V_{OL2}	3007	10	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2.5 V	EACH OUTPUT		1.25		1.25		1.25	"
V_{IL} 1/2/	Fig. 7	11	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	5.0 V	RESET	1.10		0.85		1.35		"
V_{IH}	Fig. 7	12	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	RESET		3.80		3.60		3.95	"
V_{IL}	Fig. 9	13	"	IN	IN	"	"	"	IN	"	IN	IN	"	IN	"	"	"	"	PRESET ENABLE	1.10		0.85		1.35		"
V_{IH}	"	14	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	PRESET ENABLE		3.80		3.60		3.95	"
V_{IL}	"	15	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	EACH JAM INPUT	1.10		0.85		1.35		"
V_{IH}	"	16	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	EACH JAM INPUT		3.80		3.60		3.95	"
V_{IL}	Fig. 8	17	"	GND	GND	"	"	"	GND	"	GND	GND	"	GND	"	"	"	"	CLOCK	1.10		0.85		1.35		"
V_{IH}	Fig. 8	18	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	CLOCK		3.80		3.60		3.95	"
V_{IH}	Fig. 9	19	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	DATA		3.80		3.60		3.95	"
V_{IL}	Fig. 9	20	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	DATA	1.10		0.85		1.35		"
I_{SS} 3/	3005	21	GND	15.0 V	15.0 V				15.0 V	"	15.0 V	15.0 V		15.0 V		GND	15.0 V	15.0 V	V_{SS}		-0.5		-5.0			μA
	"	22	"	"	15.0 V				GND	"	GND	"		"		GND	GND	"	V_{SS}		"		"			"
	"	23	"	"	GND				15.0 V	"	"	"		"		GND	"	"	V_{SS}		"		"			"
	"	24	"	"	GND				15.0 V	"	"	"		"		15.0 V	"	"	None		"		"			"
	"	25	"	"	GND				15.0 V	"	"	GND		"		15.0 V	"	"	V_{SS}		"		"			"
	"	26	15.0 V	GND	15.0 V				GND	"	15.0 V	15.0 V		GND		GND	"	"	V_{SS}		"		"			"
	"	27	"	"	"				GND	"	"	15.0 V		"		15.0 V	"	"	None		"		"			"
	"	28	"	"	"				GND	"	"	GND		"		15.0 V	"	"	V_{SS}		"		"			"
	"	29	"	"	"				15.0 V	"	"	15.0 V		"		15.0 V	"	"	V_{SS}		"		"			"

See footnotes at end of device type 05.

TABLE III. Group A inspection for device type 02 - Continued.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions 4/																Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 4 T_C = 25°C						
		Test no.	DATA	JAM 1	JAM 2	Q2	Q1	Q3	JAM 3	V_{SS}	JAM 4	PRESET ENABLE	Q_4	JAM 5	J_5	CLOCK	RESET	V_{DD}		Min	Max	Min	Max	Min	Max	
C_i 2/	3012	30	IN	IN	IN				IN	GND	IN	IN		IN		IN	IN	GND	EACH INPUT		12.0					pF
																				Subgroup 7 T_C = 25°C		Subgroup 8 T_C = 125°C		Subgroup 8 T_C = -55°C		
																				Min	Max	Min	Max	Min	Max	
3/	3014	31	5.0 V	5.0 V	5.0 V	L	L	L	5.0 V	GND	5.0 V	5.0 V	L	5.0 V	-	5.0 V	GND	5.0 V	EACH OUTPUT							
	"	32	5.0 V	5.0 V	5.0 V	H	H	H	5.0 V	"	5.0 V	5.0 V	H	5.0 V	H	"	5.0 V	"								
	"	33	5.0 V	GND	GND	H	H	H	GND	"	GND	GND	H	GND	H	"	5.0 V	"	"							
	"	34	GND	GND	"	H	H	H	GND	"	"	GND	H	GND	H	"	GND	"	"							
	"	35	5.0 V	5.0 V	"	H	H	H	5.0 V	"	"	GND	H	5.0 V	H	"	"	"	"							
	"	36	"	5.0 V	"	H	L	L	5.0 V	"	"	5.0 V	H	5.0 V	-	"	"	"	"							
	"	37	"	5.0 V	"	H	L	L	5.0 V	"	"	GND	H	5.0 V	-	"	"	"	"							
	"	38	"	GND	"	H	L	L	GND	"	"	"	H	GND	-	GND	"	"	"							
	"	39		"	"	L	L	H	"	"	"	"	L	"	H	5.0 V	"	"	"							
	"	40	GND	"	"	L	L	H	"	"	"	"	L	"	H	5.0 V	"	"	"							
	"	41	GND	"	"	L	L	H	"	"	"	"	L	"	H	GND	"	"	"							
	"	42	GND	"	"	L	H	L	"	"	"	"	H	"	L	5.0 V	"	"	"							
	"	43	5.0 V	"	"	L	H	L	"	"	"	"	H	"	-	5.0 V	"	"	"							
	"	44	"	"	"	L	H	L	"	"	"	"	H	"	L	GND	"	"	"							
	"	45	"	"	"	H	L	L	"	"	"	"	L	"	H	5.0 V	"	"	"							
	"	46	"	"	"	H	H	H	"	"	"	"	H	"	H	5.0 V	5.0 V	"	"							
	"	47	"	"	"	H	H	H	"	"	"	"	H	"	H	5.0 V	GND	"	"							
	"	48	"	5.0 V	5.0 V	H	H	H	"	"	5.0 V	"	H	"	H	GND	"	"	"							
	"	49	"	5.0 V	5.0 V	L	L	H	"	"	5.0 V	5.0 V	L	"	H	"	"	"	"							
	"	50	"	5.0 V	5.0 V	L	L	H	"	"	5.0 V	GND	L	"	H	"	"	"	"							
	"	51	"	GND	GND	L	L	H	5.0 V	"	GND	GND	L	5.0 V	H	"	"	"	"							
	"	52	"	"	"	H	H	L	"	"	"	5.0 V	H	"	L	"	"	"	"							
	"	53	"	"	"	H	H	L	"	"	"	GND	H	"	L	"	"	"	"							
	"	54	"	"	"	H	H	L	"	"	"	5.0 V	H	"	L	"	"	"	"							
	"	55	"	"	"	H	H	L	"	"	"	5.0 V	H	"	L	5.0 V	"	"	"							
	"	56	"	"	"	H	H	L	"	"	"	GND	H	"	L	5.0 V	"	"	"							
	"	57	GND	5.0 V	5.0 V	H	H	L	GND	"	5.0 V	GND	H	GND	L	GND	"	"	"							
	"	58	"	"	"	L	L	H	"	"	"	5.0 V	L	"	H	"	"	"	"							
	"	59	"	"	"	L	L	H	"	"	"	GND	L	"	H	"	"	"	"							
	"	60	"	"	"	L	L	H	"	"	"	5.0 V	L	"	H	"	"	"	"							
	"	61	"	"	"	L	L	H	"	"	"	5.0 V	L	"	H	5.0 V	"	"	"							
	"	62	"	"	"	L	L	H	"	"	"	GND	L	"	H	5.0 V	"	"	"							
	"	63	5.0 V	GND	"	L	H	H	"	"	"	5.0 V	L	"	H	GND	"	"	"							
	"	64	"	GND	"	L	H	H	"	"	"	GND	L	"	H	GND	"	"	"							
	"	65	"	GND	"	H	L	H	"	"	"	GND	H	"	L	5.0 V	"	"	"							
	"	66	"	5.0 V	GND	H	L	H	"	"	"	5.0 V	L	"	H	GND	"	"	"							
	"	67	"	5.0 V	GND	H	L	H	"	"	"	5.0 V	L	"	H	5.0 V	"	"	"							
	"	68	"	5.0 V	GND	H	L	H	"	"	"	GND	L	"	H	5.0 V	"	"	"							
	"	69	GND	"	"	H	H	H	"	"	"	"	H	"	H	5.0 V	5.0 V	"	"							
	"	70	"	"	"	H	H	H	"	"	"	"	H	"	H	GND	"	"	"							
	"	71	"	"	"	H	H	H	"	"	"	"	H	"	H	5.0 V	"	"	"							
	"	72	"	"	"	H	H	H	"	"	"	"	H	"	H	GND	"	"	"							
	"	73	"	"	"	H	H	H	"	"	"	"	H	"	H	5.0 V	"	"	"							

See footnotes at end of device type 05.

TABLE III. Group A inspection for device type 02 - Continued.

Symbol	MIL-STD-883 method	Cases I, F, C, N	Terminal conditions 4/																Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 9 T_C = 25°C		Subgroup 10 T_C = 125°C		Subgroup 11 T_C = -55°C		
		Test no.	DATA	JAM 1	JAM 2	Q2	Q1	Q3	JAM 3	V_{SS}	JAM 4	PRESET ENABLE	Q_4	JAM 5	Q_5	CLOCK	RESET	V_{DD}		Min	Max	Min	Max	Min	Max	
t_{PHL1} 1/2/ t_{PHL1}	3003	74 75	IN "	GND "	GND "	OUT	OUT	OUT	GND "	GND "	GND "	GND "	OUT	GND "	OUT	"	GND "	5.0 V "	CLOCK TO OUTPUT	.013 "	1.45 1.80	.018 "	2.18 2.70	.013 "	1.45 1.80	µs "
t_{PLH1} t_{PLH1}		76 77	" "	" "	" "	OUT	OUT	OUT	" "	" "	" "	" "	OUT	" "	OUT	" "	" "	" "	CLOCK TO OUTPUT	" "	1.45 1.80	" "	2.18 2.70	" "	1.45 1.80	" "
t_{PLH2} t_{PLH2}		78 79	" "	" "	" "	OUT	OUT	OUT	" "	" "	" "	" "	OUT	" "	OUT		IN IN	" "	RESET TO OUTPUT	" "	1.45 1.80	" "	2.18 2.70	" "	1.45 1.80	" "
t_{THL} t_{THL}	3004	80 81	" "	" "	" "	OUT	OUT	OUT	" "	" "	" "	" "	OUT	" "	OUT		GND GND	" "	OUTPUTS OUTPUTS	10 .010	550 2.25	14 .014	825 3.38	10 .010	550 2.25	ns µs
t_{THL1} 1/2/ t_{THL1}	3004	82 83	IN "	GND "	GND "	OUT	OUT	OUT	GND "	GND "	GND "	GND GND	OUT	" "	OUT	" "	GND GND	" "	OUTPUTS OUTPUTS	10 .010	550 2.25	14 .014	825 3.38	10 .010	550 2.25	ns µs
t_{SHL1} 2/		84	"	"	"	"	"	"	"	"	"	IN	"	"	"	"	"	"	PRESET TO CLOCK		750		1125		750	ns
t_{SHL2}		85	"	"	"	"	"	"	"	"	"	GND	"	"	"	"	IN	"	RESET TO CLOCK		750		1125		750	"
t_{SHL3}		86	"	"	"	"	"	"	"	"	"	GND	"	"	"	"	GND	"	DATA TO CLOCK		500		750		500	"
t_{SLH3}		87	"	"	"	"	"	"	"	"	"	GND	"	"	"	"	GND	"	DATA TO CLOCK		500		750		500	"

See footnotes at end of device type 05.

TABLE III. Group A inspection for device type 03.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions 4/																Measured terminal	Limits					Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_C = 25°C		Subgroup 2 T_C = 125°C		Subgroup 3 T_C = -55°C	
		Test no.	Q_{12}	Q_{13}	Q_{14}	Q_6	Q_5	Q_7	Q_4	V_{SS}	Q_1	CLOCK	RESET	Q_9	Q_8	Q_{10}	Q_{11}	V_{DD}		Min	Max	Min	Max	Min	Max	
V_{IC} (POS)		1										1 mA	1 mA					GND	EACH INPUT		1.5					V
V_{IC} (NEG)		2								GND		-1 mA	-1 mA						EACH INPUT		-6					V
I_{IL1} 6/	3009	3								"		GND	GND					15.0 V	ALL INPUTS TOGETHER		-2.0					nA
I_{IL2}	3009	4								"		GND	GND					"	EACH INPUT		-1.0		-45.0			"
I_{IH1}	3010	5								"		15.0 V	15.0 V					"	ALL INPUTS TOGETHER		2.0					"
I_{IH2}	3010	6								"		15.0 V	15.0 V					"	EACH INPUT		1.0		45.0			"
V_{OH1} 1/2/	3006	7	I_{OH4}	I_{OH4}	I_{OH4}	I_{OH4}	I_{OH4}	I_{OH4}	I_{OH4}	"	I_{OH4}	IN	IN	I_{OH4}	I_{OH4}	I_{OH4}	I_{OH4}	5.0 V	EACH OUTPUT	4.5		4.5		4.5		V
V_{OL1}	3007	8	I_{OL3}	I_{OL3}	I_{OL3}	I_{OL3}	I_{OL3}	I_{OL3}	I_{OL3}	"	I_{OL3}	"	"	I_{OL3}	I_{OL3}	I_{OL3}	I_{OL3}	5.0 V	EACH OUTPUT		500		500		500	mV
V_{OH2}	3006	9	OUT	OUT	OUT	OUT	OUT	OUT	OUT	"	OUT	"	"	OUT	OUT	OUT	OUT	12.5 V	EACH OUTPUT	11.25		11.25		11.25		V
V_{OL2}	3007	10	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	12.5 V	EACH OUTPUT		1.25		1.25		1.25	"
V_{IL} 1/2/	Fig. 8	11	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	5.0 V	CLOCK	1.10		0.85		1.35		"
V_{IH}	Fig. 8	12	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	CLOCK		3.80		3.60		3.95	"
V_{IL}	Fig. 7	13	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	RESET	1.10		0.85		1.35		"
V_{IH}	Fig. 7	14	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	RESET		3.80		3.60		3.95	"
I_{SS} 3/	3005	15								"		GND	15.0 V					15.0 V	V_{SS}		-1.0		-10.0			µA
	"	16								"		GND	GND					"	V_{SS}		"		"			"
	"	17								"		PU	"					"	None		"		"			"
	"	18								"		GND	"					"	V_{SS}		"		"			"
	"	19								"		PU	"					"	None		"		"			"
	"	20								"		15.0 V	"					"	V_{SS}		"		"			"
																				Subgroup 4 T_C = 25°C						
																				Min	Max					
C_i 2/		21								GND			IN					GND	EACH INPUT		12					pF

See footnotes at end of device type 05.

TABLE III. Group A inspection for device type 03 - Continued.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions																Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 7 T_C = 25°C		Subgroup 8 T_C = 125°C		T_C = -55°C		
		Test no.	Q_{12}	Q_{13}	Q_{14}	Q_6	Q_5	Q_7	Q_4	V_{SS}	Q_1	CLOCK	RESET	Q_9	Q_8	Q_{10}	Q_{11}	V_{DD}		Min	Max	Min	Max	Min	Max	
3/	3014	22	L	L	L	L	L	L	L	GND	L	GND	5.0 V	L	L	L	L	5.0 V	EACH OUTPUT							
"	"	23	L	L	L	L	L	L	L	"	L	GND	GND	L	L	L	L	"	"							
"	"	24	L	L	L	L	L	L	L	"	L	5.0 V	"	L	L	L	L	"	"							
"	"	25	L	L	L	L	L	L	L	"	H	GND	"	L	L	L	L	"	"							
"	"	26	L	L	L	L	L	L	L	"	H	5.0 V	"	L	L	L	L	"	"							
"	"	27	L	L	L	L	L	L	L	"	L	GND	"	L	L	L	L	"	"							
"	"	28	X	X	X	X	X	X	X	"	X	PE	"	X	X	X	X	"	"							
"	"	29	L	L	L	L	L	L	L	"	H	5.0 V	"	L	L	L	L	"	"							
"	"	30	L	L	L	L	L	L	H	"	L	GND	"	L	L	L	L	"	"							
"	"	31	X	X	X	X	X	X	X	"	X	PF	"	X	X	X	X	"	"							
"	"	32	L	L	L	L	L	L	H	"	H	5.0 V	"	L	L	L	L	"	"							
"	"	33	L	L	L	L	H	L	L	"	L	GND	"	L	L	L	L	"	"							
"	"	34	X	X	X	X	X	X	X	"	X	PG	"	X	X	X	X	"	"							
"	"	35	L	L	L	L	H	L	H	"	H	5.0 V	"	L	L	L	L	"	"							
"	"	36	L	L	L	H	L	L	L	"	L	GND	"	L	L	L	L	"	"							
"	"	37	X	X	X	X	X	X	X	"	X	PH	"	X	X	X	X	"	"							
"	"	38	L	L	L	H	H	L	H	"	H	5.0 V	"	L	L	L	L	"	"							
"	"	39	L	L	L	L	L	H	L	"	L	GND	"	L	L	L	L	"	"							
"	"	40	X	X	X	X	X	X	X	"	X	PJ	"	X	X	X	X	"	"							
"	"	41	L	L	L	H	H	H	H	"	H	5.0 V	"	L	L	L	L	"	"							
"	"	42	L	L	L	L	L	L	L	"	L	GND	"	L	H	L	L	"	"							
"	"	43	X	X	X	X	X	X	X	"	X	PL	"	X	X	X	X	"	"							
"	"	44	L	L	L	H	H	H	H	"	H	5.0 V	"	L	H	L	L	"	"							
"	"	45	L	L	L	L	L	L	L	"	L	GND	"	L	L	L	L	"	"							
"	"	46	X	X	X	X	X	X	X	"	X	PM	"	X	X	X	X	"	"							
"	"	47	L	L	L	H	H	H	H	"	H	5.0 V	"	L	H	L	L	"	"							
"	"	48	L	L	L	L	L	L	L	"	L	GND	"	L	L	H	L	"	"							
"	"	49	X	X	X	X	X	X	X	"	X	PN	"	X	X	X	X	"	"							
"	"	50	L	L	L	H	H	H	H	"	H	5.0 V	"	H	H	H	L	"	"							
"	"	51	L	L	L	L	L	L	L	"	L	GND	"	L	L	L	H	"	"							
"	"	52	X	X	X	X	X	X	X	"	X	PR	"	X	X	X	X	"	"							
"	"	53	L	L	L	H	H	H	H	"	H	5.0 V	"	H	H	H	H	"	"							
"	"	54	L	L	L	L	L	L	L	"	L	GND	"	L	L	L	L	"	"							
"	"	55	X	X	X	X	X	X	X	"	X	PS	"	X	X	X	X	"	"							
"	"	56	H	L	L	X	H	H	H	"	H	5.0 V	"	H	H	H	H	"	"							
"	"	57	L	H	L	L	L	L	L	"	L	GND	"	L	L	L	L	"	"							
"	"	58	X	X	X	X	X	X	X	"	X	PT	"	X	X	X	X	"	"							
"	"	59	H	H	L	H	H	H	H	"	H	5.0 V	"	H	H	H	H	"	"							
"	"	60	L	L	H	L	L	L	L	"	L	GND	"	L	L	L	L	"	"							
"	"	61	X	X	H	X	X	X	X	"	X	PV	"	X	X	X	X	"	"							
"	"	62	H	H	H	H	H	H	H	"	H	5.0 V	"	H	H	H	H	"	"							
"	"	63	L	L	L	L	L	L	L	"	L	GND	"	L	L	L	L	"	"							
"	"	64	X	X	X	X	X	X	X	"	X	PY	"	X	X	X	X	"	"							
"	"	65	H	L	H	H	L	L	H	"	L	GND	"	L	H	L	L	"	"							
"	"	66	L	L	L	L	L	L	L	"	L	GND	5.0 V	L	L	L	L	"	"							
"	"	67	L	L	L	L	L	L	L	"	L	GND	GND	L	L	L	L	"	"							
"	"	68	X	X	X	X	X	X	X	"	X	PU	GND	X	X	X	X	"	"							
"	"	69	L	H	L	L	H	H	L	"	H	GND	GND	H	L	L	X	H	"							
"	"	70	L	L	L	L	L	L	L	"	L	GND	5.0 V	L	L	L	L	"	"							
"	"	71	L	L	-	L	L	L	L	"	L	GND	GND	L	L	L	L	"	"							

See footnotes at end of device type 05.

TABLE III. Group A inspection for device type 03 - Continued.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions 4/															Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 9 T_C = 25°C		Subgroup 10 T_C = 125°C		Subgroup 11 T_C = -55°C		
		Test no.	Q_{12}	Q_{13}	Q_{14}	Q_6	Q_5	Q_7	Q_4	V_{SS}	Q_1	CLOCK	RESET	Q_9	Q_8	Q_{10}	Q_{11}	V_{DD}		Min	Max	Min	Max	Min	Max	
t_{PHL1} 1/ 2/	3003	72								GND		IN	GND					5.0 V	CLOCK TO	.013	0.89	.018	1.34	.013	0.89	µs
	"	73							OUT	"	OUT	"	"					"	OUTPUT	.052	3.50	.072	5.25	.052	3.50	"
	"	74					OUT			"		"	"					"		.065	4.45	.090	6.68	.065	4.45	"
	"	75				OUT				"		"	"					"		.078	5.35	.108	8.03	.078	5.35	"
	"	76						OUT		"		"	"					"		.091	6.20	.126	9.30	.091	6.20	"
	"	77								"		"	"		OUT			"		.104	7.10	.144	10.65	.104	7.10	"
	"	78								"		"	"	OUT				"		.117	8.10	.162	12.15	.117	8.10	"
	"	79								"		"	"			OUT		"		.130	8.90	.180	13.35	.130	8.90	"
	"	80								"		"	"					"		.143	9.90	.198	14.85	.143	9.90	"
	"	81	OUT							"		"	"				OUT	"		.156	10.70	.216	16.05	.156	10.70	"
	"	82		OUT						"		"	"					"		.169	11.60	.234	17.40	.169	11.60	"
	"	83			OUT					"		"	"					"		.182	12.50	.252	18.75	.182	12.50	"
t_{PLH1}	"	84								"	OUT	"	"					"								
	"	85							OUT	"		"	"					"		.013	0.89	.018	1.34	.013	0.89	"
	"	86					OUT			"		"	"					"		.052	3.50	.072	5.25	.052	3.50	"
	"	87				OUT				"		"	"					"		.065	4.45	.090	6.68	.065	4.45	"
	"	88						OUT		"		"	"					"		.078	5.35	.108	8.03	.078	5.35	"
	"	89								"		"	"		OUT			"		.091	6.20	.126	9.30	.091	6.20	"
	"	90								"		"	"	OUT				"		.104	7.10	.144	10.65	.104	7.10	"
	"	91								"		"	"			OUT		"		.117	8.10	.162	12.15	.117	8.10	"
	"	92								"		"	"					"		.130	8.90	.180	13.35	.130	8.90	"
	"	93	OUT							"		"	"				OUT	"		.143	9.90	.198	14.85	.143	9.90	"
	"	94		OUT						"		"	"					"		.156	10.70	.216	16.05	.156	10.70	"
	"	95			OUT					"		"	"					"		.169	11.60	.234	17.40	.169	11.60	"
																				.182	12.50	.252	18.75	.182	12.50	"
t_{PHL2}	"	96	OUT	OUT	"	OUT	OUT	OUT	OUT	"	OUT	"	IN	OUT	OUT	OUT	OUT	"	RESET TO OUTPUT	.013	3.30	.018	4.95	.013	3.30	"
t_{THL}	3004	97	"	"	"	"	"	"	"	"	"	"	GND	"	"	"	"	"	OUTPUT	.010	1.15	.014	1.73	.010	1.15	"
t_{TLH}	3004	98	"	"	"	"	"	"	"	"	"	"	GND	"	"	"	"	"	OUTPUT	.010	1.15	.014	1.73	.010	1.15	"

See footnotes at end of device type 05.

TABLE III. Group A inspection for device type 04.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions 4/																Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_C = 25°C		Subgroup 2 T_C = 125°C		Subgroup 3 T_C = -55°C		
		Test no.	1 OUT	0 OUT	2 OUT	5 OUT	6 OUT	NC	3 OUT	V_{SS}	NC	7 OUT	4 OUT	CARRY OUT	CLOCK ENABLE	CLOCK	RESET	V_{DD}		Min	Max	Min	Max	Min	Max	
V_{IC} (POS)		1													1 mA	1 mA	1 mA	GND	EACH INPUT		1.5					V
V_{IC} (NEG)		2								GND					-1 mA	-1 mA	-1 mA		EACH INPUT		-6.0					V
I_{IL1} 6/	3009	3								"					GND	GND	GND	15.0 V	ALL INPUTS TOGETHER		-3.0					nA
I_{IL2}	3009	4								"					GND	GND	GND	"	EACH INPUT		-1.0		-45.0			"
I_{IH1}	3010	5								"					15.0 V	15.0 V	15.0 V	"	ALL INPUTS TOGETHER		3.0					"
I_{IH2}	3010	6								"					15.0 V	15.0 V	15.0 V	"	EACH INPUT		1.0		45.0			"
V_{OH1} 1/2/	3006	7	I_{OH5}	I_{OH5}	I_{OH5}	I_{OH5}	I_{OH5}		I_{OH5}	"		I_{OH5}	I_{OH5}	I_{OH2}	GND	IN	IN	5.0 V	EACH OUTPUT	4.5		4.5		4.5		V
V_{OL1}	3007	8	I_{OL4}	I_{OL4}	I_{OL4}	I_{OL4}	I_{OL4}		I_{OL4}	"		I_{OL4}	I_{OL4}	I_{OL2}	"	"	"	5.0 V	EACH OUTPUT		500		500		500	mV
V_{OH2}	3006	9	OUT	OUT	OUT	OUT	OUT		OUT	"		OUT	OUT	OUT	"	"	"	12.5 V	EACH OUTPUT	11.25		11.25		11.25		V
V_{OL2}	3007	10	"	"	"	"	"		"	"		"	"	"	"	"	"	12.5 V	EACH OUTPUT		1.25		1.25		1.25	"
V_{IL} 1/2/	Fig. 8	11	"	"	"	"	"		"	"		"	"	"	IN	"	"	5.0 V	CLOCK ENABLE	1.10		0.85		1.35		"
V_{IH}	"	12	"	"	"	"	"		"	"		"	"	"	IN	"	"	"	CLOCK ENABLE		3.80		3.60		3.95	"
V_{IL}	"	13	"	"	"	"	"		"	"		"	"	"	GND	"	"	"	CLOCK	1.10		0.85		1.35		"
V_{IH}	"	14	"	"	"	"	"		"	"		"	"	"	"	"	"	"	CLOCK		3.80		3.60		3.95	"
V_{IL}	Fig. 7	15	"	"	"	"	"		"	"		"	"	"	"	"	"	"	RESET	1.10		0.85		1.35		"
V_{IH}		16	"	"	"	"	"		"	"		"	"	"	"	"	"	"	RESET		3.80		3.60		3.95	"
I_{SS} 3/	3005	17								"					"	GND	15.0 V	15.0 V	V_{SS}		-0.5		-5.0			µA
	"	18								"					"	GND	GND	"	V_{SS}		"		"			"
	"	19								"					"	15.0 V	"	"	None		"		"			"
	"	20								"					"	GND	"	"	V_{SS}		"		"			"
	"	21								"					"	15.0 V	"	"	None		"		"			"
	"	22								"					"	GND	"	"	V_{SS}		"		"			"
	"	23								"					"	15.0 V	"	"	None		"		"			"
	"	24								"					"	GND	"	"	V_{SS}		"		"			"
	"	25								"					"	15.0 V	"	"	V_{SS}		"		"			"
	"	26								"					"	GND	"	"	None		"		"			"
	"	27								"					"	15.0 V	"	"	V_{SS}		"		"			"
	"	28								"					"	GND	"	"	None		"		"			"
	"	29								"					"	15.0 V	"	"	V_{SS}		"		"			"
	"	30								"					"	GND	"	"	None		"		"			"
	"	31								"					"	15.0 V	"	"	V_{SS}		"		"			"
	"	32								"					15.0 V	15.0 V	"	"	V_{SS}		"		"			"

See footnotes at end of device type 05.

TABLE III. Group A inspection for device type 04 - Continued.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions															Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 4 T_C = 25°C					
		Test no.	1 OUT	0 OUT	2 OUT	5 OUT	6 OUT	NC	3 OUT	V_{SS}	NC	7 OUT	4 OUT	CARRY OUT	CLOCK ENABLE	CLOCK	RESET	V_{DD}		Min	Max	Min	Max	Min	Max	
C_i 2/	3012	33								GND					IN	IN	IN	GND	EACH INPUT		12					pF
																				Subgroup 7 T_C = 25°C		Subgroup 8 T_C = 125°C		T_C = -55°C		
																				Min	Max	Min	Max	Min	Max	
3/	3014	34	L	H	L	L	L		L	GND		L	L	H	GND	5.0 V	5.0 V	5.0 V	EACH							
	"	35	L	H	L	L	L		L	"		L	L	H	"	5.0 V	GND	"	OUTPUT							
	"	36	H	L	L	L	L		L	"		L	L	H	"	PA	"	"	"							
	"	37	L	L	H	L	L		L	"		L	L	H	"	"	"	"	"							
	"	38	L	L	L	L	L		H	"		L	L	H	"	"	"	"	"							
	"	39	L	L	L	L	L		L	"		L	H	L	"	"	"	"	"							
	"	40	L	L	L	H	L		L	"		L	L	L	"	"	"	"	"							
	"	41	L	L	L	L	H		L	"		L	L	L	"	"	"	"	"							
	"	42	L	L	L	L	L		L	"		H	L	L	"	"	"	"	"							
	"	43	L	H	L	L	L		L	"		L	L	H	"	"	"	"	"							
	"	44	H	L	L	L	L		L	"		L	L	H	"	"	"	"	"							
	"	45	H	L	L	L	L		L	"		L	L	H	5.0 V	5.0 V	"	"	"							
	"	46	H	L	L	L	L		L	"		L	L	H	5.0 V	GND	"	"	"							
	"	47	H	L	L	L	L		L	"		L	L	H	5.0 V	5.0 V	"	"	"							
	"	48	L	L	H	L	L		L	"		L	L	H	GND	5.0 V	"	"	"							
	"	49	X	X	X	X	X		X	"		X	X	X	"	PB	"	"	"							
	"	50	L	L	L	L	L		L	"		L	H	L	"	5.0 V	"	"	"							
	"	51	L	L	L	L	L		L	"		L	H	L	"	GND	"	"	"							
	"	52	L	H	L	L	L		L	"		L	L	H	"	GND	5.0 V	"	"							
	"	53	L	H	L	L	L		L	"		L	L	H	"	GND	GND	"	"							
	"	54	H	L	L	L	L		L	"		L	L	H	"	5.0 V	"	"	"							
	"	55	X	X	X	X	X		X	"		X	X	X	"	PC	"	"	"							
	"	56	L	L	L	L	L		L	"		L	H	L	"	5.0 V	"	"	"							
	"	57	L	H	L	L	L		L	"		L	L	H	"	5.0 V	5.0 V	"	"							
	"	58	L	H	L	L	L		L	"		L	L	H	"	5.0 V	GND	"	"							
																				Subgroup 9 T_C = 25°C		Subgroup 10 T_C = 125°C		Subgroup 11 T_C = -55°C		
																				Min	Max	Min	Max	Min	Max	
t_{PHL1} 1/2/	3003	59																								
t_{PHL1}	"	60	OUT	OUT	OUT	OUT	OUT		OUT	GND		OUT	OUT	OUT	GND	IN	GND	5.0 V	CLOCK TO OUTPUT	.013	1.20	.018	1.80	.013	1.20	µs
										"					"	"		"	"	"	2.25	"	3.38	"	2.25	"
t_{PLH1}	"	61																								
t_{PLH1}	"	62	OUT	OUT	OUT	OUT	OUT		OUT	"		OUT	OUT	OUT	"	"	GND	"	CLOCK TO OUTPUT	"	1.20	"	1.80	"	1.20	"
															"	"		"	"	"	2.25	"	3.38	"	2.25	"
t_{PLH2}	"	63		OUT						"					"	"	IN	"	RESET TO OUTPUT	"	2.25	"	3.38	"	2.25	"
t_{PLH2}	"	64								"				OUT	"	"		"		"	1.20	"	1.80	"	1.20	"
t_{PHL2}	"	65	OUT		OUT	OUT	OUT		OUT	"		OUT	OUT		"	"	IN	"	RESET TO OUTPUT	"	2.25	"	3.38	"	2.25	
t_{THL}	3004	66								"				OUT	"	"	GND	"	OUTPUT	10	500	14	750	10	500	ns
t_{THL}	"	67	OUT	OUT	OUT	OUT	OUT		OUT	"		OUT	OUT		"	"		"	OUTPUT	"	500	"	750	"	300	ns
t_{TLH}	"	68								"				OUT	"	"	GND	"	OUTPUT	"	600	"	900	"	600	ns
t_{TLH}	"	69	OUT	OUT	OUT	OUT	OUT		OUT	"		OUT	OUT		"	"	"	"	OUTPUT	"	600	"	900	"	600	ns
t_{SHL1} 2/	"	70								"				OUT	IN	"	"	"	CLOCK ENABLE TO CLOCK		500		750		500	ns
t_{SHL1}	"	71	OUT	OUT	OUT	OUT	OUT		OUT	"		OUT	OUT		IN	"	"	"	CLOCK ENABLE TO CLOCK		750		1125		750	ns
t_{SHL2}	"	72	OUT	OUT						"					GND	"	IN	"	RESET TO CLOCK		750		1125		750	ns

See footnotes at end of device type 05.

TABLE III. Group A inspection for device type 05.

Symbol	MIL-STD-883 method	Cases A,B,C,D,T,X,Y	Terminal conditions														Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Subgroup 1 T_C = 25°C		Subgroup 2 T_C = 125°C		Subgroup 3 T_C = -55°C		
		Test no.	CLOCK	RESET	Q_7	Q_6	Q_5	Q_4	V_{SS}	NC	Q_3	NC	Q_2	Q_1	NC	V_{DD}		Min	Max	Min	Max	Min	Max	
V_{IC} (POS)		1	1 mA	1 mA												GND	EACH INPUT		1.5					V
V_{IC} (NEG)		2	-1 mA	-1 mA					GND								EACH INPUT		-6.0					V
I_{IL} 6/	3009	3	GND	GND					"							15.0 V	CLOCK		-1.0		-45			nA
I_{IL}	3009	4	GND	GND					"							"	RESET		-1.0		-45			"
I_{IH}	3010	5	15.0 V	GND					"							"	CLOCK		1.0		45			"
I_{IH}	3010	6	GND	15.0 V					"							"	RESET		1.0		45			"
V_{OH1} 1/ 2/	3006	7	IN	IN	I_{OH2}	I_{OH2}	I_{OH2}	I_{OH2}	"		I_{OH2}		I_{OH2}	I_{OH2}		5.0 V	EACH OUTPUT	4.5		4.5		4.5		V
V_{OL1}	3007	8	"	"	I_{OL5}	I_{OL5}	I_{OL5}	I_{OL5}	"		I_{OL5}		I_{OL5}	I_{OL5}		5.0 V	EACH OUTPUT		500		500		500	mV
V_{OH2}	3006	9	"	"	OUT	OUT	OUT	OUT	"		OUT		OUT	OUT		12.5 V	EACH OUTPUT	11.25		11.25		11.25		V
V_{OL2}	3007	10	"	"	"	"	"	"	"		"		"	"		12.5 V	EACH OUTPUT		1.25		1.25		1.25	"
V_{IL} 1/ 2/	Fig. 8	11	"	"	"	"	"	"	"		"		"	"		5.0 V	CLOCK	1.10		0.85		1.35		"
V_{IH}	Fig. 8	12	"	"	"	"	"	"	"		"		"	"		"	CLOCK		3.80		3.60		3.95	"
V_{IL}	Fig. 7	13	"	"	"	"	"	"	"		"		"	"		"	RESET	1.10		0.85		1.35		"
V_{IH}	Fig. 7	14	"	"	"	"	"	"	"		"		"	"		"	RESET		3.80		3.60		3.95	"
I_{SS} 3/	3005	15	GND	15.0 V					"							15.0 V	V_{SS}		-0.5		-5.0			μA
	"	16	GND	GND					"							"	V_{SS}		"		"			"
	"	17	PI	"					"							"	None		"		"			"
	"	18	15.0 V	"					"							"	V_{SS}		"		"			"
	"	19	GND	"					"							"	None		"		"			"
	"	20	PI	"					"							"	None		"		"			"
	"	21	GND	"					"							"	V_{SS}		"		"			"
																		Subgroup 4 T_C = 25°C						
																		Min	Max					
C_I 2/	3002	22	IN	IN					GND							GND	EACH OUTPUT		12					pF

See footnotes at end of device type 05.

TABLE III. Group A inspection for device type 05 - Continued.

Symbol	MIL-STD-883 method	Cases A,B,C,D, T,X,Y	Terminal conditions														Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Subgroup 7 T_C = 25°C		Subgroup 8 T_C = 125°C		Subgroup 8 T_C = -55°C		
		Test no.	CLOCK	RESET	Q_7	Q_6	Q_5	Q_4	V_{SS}	NC	Q_3	NC	Q_2	Q_1	NC	V_{DD}		Min	Max	Min	Max	Min	Max	
3/	3014	23	GND	5.0 V	L	L	L	L	GND		L		L	L		5.0 V	Each output							
"	"	24	GND	GND	L	L	L	L	"		L		L	L		"	"							
"	"	25	5.0 V	"	L	L	L	L	"		L		L	L		"	"							
"	"	26	GND	"	L	L	L	L	"		L		L	H		"	"							
"	"	27	5.0 V	"	L	L	L	L	"		L		L			"	"							
"	"	28	GND	"	L	L	L	L	"		L		H			"	"							
"	"	29	5.0 V	"	L	L	L	L	"		L		H	L		"	"							
"	"	30	GND	"	L	L	L	L	"		L		H	H		"	"							
"	"	31	5.0 V	"	L	L	L	L	"		L		H	H		"	"							
"	"	32	GND	"	L	L	L	L	"		H		L	L		"	"							
"	"	33	PC	"	X	X	X	X	"		X		X	X		"	"							
"	"	34	5.0 V	"	L	L	L	L	"		H		H	H		"	"							
"	"	35	GND	"	L	L	L	H	"		L		L	L		"	"							
"	"	36	PF	"	X	X	X	X	"		X		X	X		"	"							
"	"	37	5.0 V	"	L	L	L	H	"		H		H	H		"	"							
"	"	38	GND	"	L	L	H	L	"		L		L	L		"	"							
"	"	39	PG	"	X	X	X	X	"		X		X	X		"	"							
"	"	40	5.0 V	"	L	L	H	H	"		H		H	H		"	"							
"	"	41	GND	"	L	H	L	L	"		L		L	L		"	"							
"	"	42	PH	"	X	X	X	X	"		X		X	X		"	"							
"	"	43	5.0 V	"	L	H	H	H	"		H		H	H		"	"							
"	"	44	GND	"	H	L	L	L	"		L		L	L		"	"							
"	"	45	PJ	"	X	X	X	X	"		X		X	X		"	"							
"	"	46	5.0 V	"	H	H	H	H	"		H		H	H		"	"							
"	"	47	GND	"	L	L	L	L	"		L		L	L		"	"							
"	"	48	PI	"	X	X	X	X	"		X		X	X		"	"							
"	"	49	GND	"	L	H	L	H	"		L		H	L		"	"							
"	"	50	GND	5.0 V	L	L	L	L	"		L		L	L		"	"							
"	"	51	GND	GND	L	L	L	L	"		L		L	L		"	"							
"	"	52	PK	GND	X	X	X	X	"		X		X	X		"	"							
"	"	53	GND	GND	H	L	H	L	"		H		L	H		"	"							
"	"	54	GND	5.0 V	L	L	L	L	"		L		L	L		"	"							
"	"	55	GND	GND	L	L	L	L	"		L		L	L		"	"							
																		Subgroup 9 T_C= 25°C		Subgroup 10 T_C = 125°C		Subgroup 11 T_C = -55°C		
																		Min	Max	Min	Max	Min	Max	
t_{PHL1} 1/2/	3003	56	IN	GND					GND				OUT	OUT		5.0 V	CLOCK TO OUTPUT	.013	0.44	.018	0.66	.013	0.44	µs
"	"	57	"	"					"				"			"	"	.026	0.88	.036	1.32	.026	0.88	"
"	"	58	"	"					"		OUT					"	"	.039	1.32	.054	1.98	.039	1.32	"
"	"	59	"	"				OUT	"							"	"	.052	1.76	.072	2.64	.052	1.76	"
"	"	60	"	"			OUT		"							"	"	.065	2.20	.090	3.30	.065	2.20	"
"	"	61	"	"		OUT			"							"	"	.078	2.64	.108	3.96	.078	2.64	"
"	"	62	"	"	OUT				"							"	"	.091	3.10	.126	4.65	.091	3.10	"
t_{PLH1}	"	63	"	"					"					OUT		"	"	.013	0.44	.018	0.66	.013	0.44	"
"	"	64	"	"					"				OUT			"	"	.026	0.88	.036	1.32	.026	0.88	"
"	"	65	"	"					"		OUT					"	"	.039	1.32	.054	1.98	.039	1.32	"
"	"	66	"	"				OUT	"							"	"	.052	1.76	.072	2.64	.052	1.76	"
"	"	67	"	"			OUT		"							"	"	.065	2.20	.090	3.30	.065	2.20	"
"	"	68	"	"		OUT			"							"	"	.078	2.64	.108	3.96	.078	2.64	"
"	"	69	"	"	OUT				"							"	"	.091	3.10	.126	4.65	.091	3.10	"
t_{PHL2}	"	70	"	IN	OUT	OUT	OUT	OUT	"		OUT		OUT	OUT		"	RESET TO OUTPUT	.013	1.50	.018	2.25	.013	1.50	µs
t_{THL}	3004	71	"	GND	"	"	"	"	"		"		"	"		"	OUTPUT	10	430	14	645	10	430	ns
t_{TLH}	3004	72	"	GND	"	"	"	"	"		"		"	"		"	OUTPUT	10	700	14	1050	10	700	ns

See footnotes at end of device type 05.

1/ Unless otherwise specified, separately monitor or measure as required, each device terminal designated "OUT", "I_{OI}", and "I_{OL}" in the terminal condition columns of table III. Values for "I_{OH}" and "I_{OL}" are specified in footnote 5.

2/ Terminals designated "IN" indicate conditions and test methods are specified in footnote 5 and figures 6 through 10 or for "C_i" measurement, 4.4.1c.

3/ This I_{SS} and functional tests shall be performed in the test number sequence shown with no intervening changes to terminal conditions. The functional test shall be performed with V_{IH} and $V_{DD} \leq 5.0$ V and ≥ 15.0 V. Table III shows the lower of these two voltages. During the functinal test, input terminals designated "PA", "PB", etc., shall have applied thereto a specified number of single pulses with the following parameters: Pulse amplitude = V_{DD} maximum to V_{DD} = 4% minimum. These pulses are enumerated as follows:

Symbol	Pulses	Symbol	Pulses	Symbol	Pulses	Symbol	Pulses
PA	1	PF	7	PK	85	PS	2047
PB	2	PG	15	PL	127	PT	4095
PC	3	PH	31	PM	255	PU	5461
PD	4	PI	42	PN	511	PV	8191
PE	5	PJ	63	PR	1023	PY	10922

During the functional tests, device output voltages are: don't care "X", high "H", or low "L" as specified in the terminal conditions columns. The output voltage limits over the specified temperature range are "H" = V_{DD} -0.50 V minimum and "L" = V_{SS} +0.50 V maximum.

4/ Undesignated terminal conditions indicate terminal may be high-level logic, low-level logic, or open except as follows:

$V_{IC(POS)}$ tests, the V_{SS} terminals shall be open; $V_{IC(NEG)}$ tests, the V_{DD} terminals shall be open; I_{SS} tests, the output terminals shall be open.

5/ The following input voltages and output currents are terminal conditions for group A inspection:

Symbol / Temperature	V_{IH1} Max (V)	V_{IL1} Min (V)	V_{IH2} Max (V)	V_{IL2} Min (V)	I_{OH1} (μA)	I_{OH2} (μA)	I_{OH3} (μA)	I_{OH4} (μA)	I_{OH5} (μA)	I_{OL1} (μA)	I_{OL2} (μA)	I_{OL3} (μA)	I_{OL4} (μA)	$I_{0.5}$ (μA)
25°C	3.80	1.10	9.50	2.80	-30	-150	-50	-90	-30	50	150	100	50	250
125°C	3.60	0.85	9.25	2.55	-21	-105	-40	-65	-21	35	105	90	35	175
-55°C	3.95	1.35	9.75	3.05	-38.0	-185	-75	-110	-38	60	185	125	60	310

6/ The device manufacturer may, at his option, measure I_{IL} and I_{IH} at 25°C for each individual input or measure all inputs together.

7/ Data pin need only be toggled high or low to allow outputs to achieve the proper setup state required to verify the indicated test parameter.

TABLE III. Group A inspection for device type 51.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions 1/																Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_C = 25°C		Subgroup 2 T_C = 125°C		Subgroup 3 T_C = -55°C		
		Test no.	5 OUT	1 OUT	0 OUT	2 OUT	6 OUT	7 OUT	3 OUT	V_{SS}	8 OUT	4 OUT	9 OUT	CARRY OUT	CLOCK ENABLE	CLOCK	RESET	V_{DD}		Min	Max	Min	Max	Min	Max	
V_{IC} (POS)		1													1 mA	1 mA	1 mA	GND	EACH INPUT		1.5					V
V_{IC} (NEG)		2								GND					-1 mA	-1 mA	-1 mA		EACH INPUT		-6.0					V
I_{IL1} 2/	3009	3								"					GND	GND	GND	18.0 V	ALL INPUTS TOGETHER		-3.0					nA
I_{IL2}	3009	4								"					GND	GND	GND	"	EACH INPUT		-1.0		-15.0			"
I_{IH1}		5								"					18.0 V	18.0 V	18.0 V	"	ALL INPUTS TOGETHER		3.0					"
I_{IH2}	3010	6								"					18.0 V	18.0 V	18.0 V	"	EACH INPUT		1.0		15.0			"
I_{OL}		7	4/	4/	4/	4/	4/	4/	4/	"	4/	4/	4/	4/	4/	4/	4/	4/	EACH OUTPUT	4/	4/	4/	4/	4/	4/	mA
I_{OH}		8	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	mA
V_{OL}	3007	9	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	V
V_{OH}	3006	10	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
V_{IL}		11	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	EACH INPUT	"	"	"	"	"	"	"
V_{IH}		12	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	EACH INPUT	"	"	"	"	"	"	"
I_{SS} 5/	3005	13							GND	"					GND	GND	18.0 V	18.0 V	V_{SS}		-0.5		-5.0			µA
	"	14							"	"					"	GND	GND	"	V_{SS}		"		"			"
	"	15							"	"					"	18.0 V	"	"	None		"		"			"
	"	16							"	"					"	GND	"	"	V_{SS}		"		"			"
	"	17							"	"					"	18.0 V	"	"	None		"		"			"
	"	18							"	"					"	GND	"	"	V_{SS}		"		"			"
	"	19							"	"					"	18.0 V	"	"	None		"		"			"
	"	20							"	"					"	GND	"	"	V_{SS}		"		"			"
	"	21							"	"					"	18.0 V	"	"	None		"		"			"
	"	22							"	"					"	GND	"	"	V_{SS}		"		"			"
	"	23							"	"					"	18.0 V	"	"	V_{SS}		"		"			"
	"	24							"	"					"	GND	"	"	None		"		"			"
	"	25							"	"					"	18.0 V	"	"	V_{SS}		"		"			"
	"	26							"	"					"	GND	"	"	None		"		"			"
	"	27							"	"					"	18.0 V	"	"	V_{SS}		"		"			"
	"	28							"	"					"	GND	"	"	None		"		"			"
	"	29							"	"					"	18.0 V	"	"	V_{SS}		"		"			"
	"	30							"	"					"	GND	"	"	None		"		"			"
	"	31							"	"					"	18.0 V	"	"	V_{SS}		"		"			"
	"	32							"	"					18.0 V	18.0 V	"	"	V_{SS}		"		"			"

See footnotes at end of device type 55.

TABLE III. Group A inspection for device type 51 - Continued.

Symbol	MIL-STD-883 method	Cases E, F, Z, K	Terminal conditions 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Limits Subgroup 4 T_C = 25°C Min	Max	Unit
		Test no.	5 OUT	1 OUT	0 OUT	2 OUT	6 OUT	7 OUT	3 OUT	V_{SS}	8 OUT	4 OUT	9 OUT	CARRY OUT	CLOCK ENABLE	CLOCK	RESET	V_{DD}				
C_I 3/	3012	33							GND						IN	IN	IN	GND	EACH INPUT		12.0	pF
																				Subgroup 7 T_C = 25°C Min	Max	Subgroup 8 T_C = 125°C Min	Max	T_C = -55°C Min	Max	
Truth table test 5/	3014	34	L	L	H	L	L	L	L	GND	L	L	L	H	GND	5.0 V	5.0 V	5.0 V	EACH OUTPUT							
	"	35	L	L	H	L	L	L	L	"	L	L	L	H	"	5.0 V	GND	"	"							
	"	36	L	H	L	L	L	L	L	"	L	L	L	H	"	PA	"	"	"							
	"	37	L	L	L	H	L	L	L	"	L	L	L	H	"	"	"	"	"							
	"	38	L	L	L	L	L	L	H	"	L	L	L	H	"	"	"	"	"							
	"	39	L	L	L	L	L	L	L	"	L	H	L	H	"	"	"	"	"							
	"	40	H	L	L	L	L	L	L	"	L	L	L	L	"	"	"	"	"							
	"	41	L	L	L	L	H	L	L	"	L	L	L	L	"	"	"	"	"							
	"	42	L	L	L	L	L	H	L	"	L	L	L	L	"	"	"	"	"							
	"	43	L	L	L	L	L	L	L	"	H	L	L	L	"	"	"	"	"							
	"	44	L	L	L	L	L	L	L	"	L	L	H	L	"	"	"	"	"							
	"	45	L	L	H	L	L	L	L	"	L	L	L	H	"	"	"	"	"							
	"	46	L	H	L	L	L	L	L	"	L	L	L	H	"	"	"	"	"							
	"	47	L	H	L	L	L	L	L	"	L	L	L	H	5.0 V	5.0 V	"	"	"							
	"	48	L	H	L	L	L	L	L	"	L	L	L	H	5.0 V	PA	"	"	"							
	"	49	L	L	L	H	L	L	L	"	L	L	L	H	GND	5.0 V	"	"	"							
	"	50	X	X	X	X	X	X	X	"	X	X	X	X	"	PC	"	"	"							
	"	51	H	L	L	L	L	L	L	"	L	L	L	L	"	5.0 V	"	"	"							
	"	52	H	L	L	L	L	L	L	"	L	L	L	L	"	GND	"	"	"							
	"	53	L	L	H	L	L	L	L	"	L	L	L	H	"	GND	5.0 V	"	"							
	"	54	L	L	H	L	L	L	L	"	L	L	L	H	"	GND	GND	"	"							
	"	55	L	H	L	L	L	L	L	"	L	L	L	H	"	5.0 V	"	"	"							
	"	56	X	X	X	X	X	X	X	"	X	X	X	X	"	PD	"	"	"							
	"	57	H	L	L	L	L	L	L	"	L	L	L	L	"	5.0 V	"	"	"							
	"	58	L	L	H	L	L	L	L	"	L	L	L	H	"	5.0 V	5.0 V	"	"							
	"	59	L	L	H	L	L	L	L	"	L	L	L	H	"	5.0 V	GND	"	"							
																				Subgroup 9 T_C = 25°C Min	Max	Subgroup 10 T_C = 125°C Min	Max	Subgroup 11 T_C = -55°C Min	Max	
t_{PHL1} 6/ t_{PHL1}	3003 "	60 61	OUT	OUT	OUT	OUT	OUT	OUT	OUT	GND "	OUT	OUT	OUT	OUT	GND "	IN "	GND "	5.0 V "	CLOCK TO OUTPUT	.013 "	.080 1.0	.018 "	.112 1.40	.013 "	.080 1.0	µs "
t_{PLH1} t_{PLH1}	" "	62 63	OUT	OUT	OUT	OUT	OUT	OUT	OUT	"	OUT	OUT	OUT	OUT	"	"	"	"	CLOCK TO OUTPUT	"	.080 1.0	"	.112 1.40	"	.080 1.0	" "
t_{PLH2} t_{PLH2}	" "	64 65			OUT					"				OUT	"	"	IN	"	RESET TO OUTPUT	"	1.0 .080	"	1.40 1.12	"	1.0 .080	" "
t_{PHL2}	"	66	OUT	OUT		OUT	OUT	OUT	OUT	"	OUT	OUT	OUT		"	"	"	"	RESET TO OUTPUT	"	1.0	"	1.40	"	1.0	" "
t_{THL} t_{THL}	3004	67 68	OUT	OUT	OUT	OUT	OUT	OUT	OUT	"	OUT	OUT	OUT	OUT	"	'	GND "	"	OUTPUT OUTPUT	10 .010	200 200	14 .014	280 280	10 .010	200 200	ns "
t_{TLH} t_{TLH}	3004	69 70	OUT	OUT	OUT	OUT	OUT	OUT	OUT	"	OUT	OUT	OUT	OUT	"	'	"	"	OUTPUT OUTPUT	10 .010	360 360	14 .014	504 504	10 .010	360 360	" "
t_{SHL1} t_{SHL1}	See Fig. 10 6/	71 72	OUT	OUT	OUT	OUT	OUT	OUT	OUT	"	OUT	OUT	OUT	OUT	IN IN	' '	" "	" "	CLOCK ENABLE TO CLOCK CLOCK ENABLE TO CLOCK		240 240		336 336		240 240	" "
t_{SHL2}		73			OUT					"					GND	'	IN	"	RESET TO CLOCK		400		560		400	"

See footnotes at end of device type 55.

TABLE III. Group A inspection for device type 52.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions 1/																Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_C = 25°C		Subgroup 2 T_C = 125°C		Subgroup 3 T_C = -55°C		
		Test no.	DATA	JAM 1	JAM 2	Q2	Q1	Q3	JAM 3	V_{SS}	JAM 4	RESET ENABLE	Q4	JAM 5	Q5	CLOCK	RESET	V_{DD}		Min	Max	Min	Max	Min	Max	
V_{IC} (POS)		1	1 mA	1 mA	1 mA				1 mA		1 mA	1 mA		1 mA		1 mA	1 mA	GND	EACH INPUT		1.5					V
V_{IC} (NEG)		2	-1 mA	-1 mA	-1 mA				-1 mA	GND	-1 mA	-1 mA		-1 mA		-1 mA	-1 mA		EACH INPUT		-6.0					V
I_{IL1} 2/	3009	3	GND	GND	GND				GND	"	GND	GND		GND		GND	GND	18.0 V	ALL INPUTS TOGETHER		-9.0					nA
I_{IL2}	3009	4	GND	GND	GND				GND	"	GND	GND	GND		GND	GND	"	EACH INPUT		-1.0		-45.0				"
I_{IH1}	3010	5	18.0 V	18.0 V	18.0 V				18.0 V	"	18.0 V	18.0 V		18.0 V		18.0 V	18.0 V	"	ALL INPUTS TOGETHER		9.0					"
I_{IH2}	3010	6	18.0 V	18.0 V	18.0 V				18.0 V	"	18.0 V	18.0 V		18.0 V		18.0 V	18.0 V	"	EACH INPUT		1.0		45.0			"
I_{OL}		7	4/	4/	4/	4/	4/	4/	4/	"	4/	4/	4/	4/	4/	4/	4/	4/	EACH OUTPUT	4/	4/	4/	4/	4/	4/	mA
I_{OH}		8	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	mA
V_{OL}	3007	9	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	V
V_{OH}	3006	10	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
V_{IL}		11	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	EACH INPUT	"	"	"	"	"	"	"
V_{IH}		12	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	EACH INPUT	"	"	"	"	"	"	"
I_{SS} 3/	3005	13	GND	18.0 V	18.0 V				18.0 V	"	18.0 V	18.0 V		18.0 V		GND	18.0 V	18.0 V	V_{SS}		-0.5		-5.0			µA
	"	14	"	"	18.0 V				GND	"	GND	"		"		GND	GND	"	V_{SS}		"		"			"
	"	15	"	"	GND				18.0 V	"	"	"		"		GND	"	"	V_{SS}		"		"			"
	"	16	"	"	GND				18.0 V	"	"	"		"		18.0 V	"	"	None		"		"			"
	"	17	"	"	GND				18.0 V	"	"	GND		"		18.0 V	"	"	V_{SS}		"		"			"
	"	18	18.0 V	GND	18.0 V				GND	"	18.0 V	18.0 V		GND		GND	"	"	V_{SS}		"		"			"
	"	19	"	"	"				GND	"	"	18.0 V		"		18.0 V	"	"	None		"		"			"
	"	20	"	"	"				GND	"	"	GND		"		18.0 V	"	"	V_{SS}		"		"			"
	"	21	"	"	"				18.0 V	"	"	18.0 V		"		18.0 V	"	"	V_{SS}		"		"			"

See footnotes at end of device type 55.

TABLE III. Group A inspection for device type 52 - Continued.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions 1/																Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 4 T_C = 25°C						
		Test no.	DATA	JAM 1	JAM 2	Q2	Q1	Q3	JAM 3	V_{SS}	JAM 4	PRESET ENABLE	Q_4	JAM 5	Q_5	CLOCK	RESET	V_{DD}		Min	Max	Min	Max	Min	Max	
C_i 3/	3012	22	IN	IN	IN				IN	GND	IN	IN		IN			IN	GND	EACH INPUT		12.0					pF
																				Subgroup 7 T_C = 25°C		Subgroup 8 T_C = 125°C		T_C = -55°C		
																				Min	Max	Min	Max	Min	Max	
Truth table test 5/	3014	23	5.0 V	5.0 V	5.0 V	L	L	L	5.0 V	GND	5.0 V	5.0 V	L	5.0 V	L	5.0 V	GND	5.0 V	EACH OUTPUT							
	"	24	5.0 V	5.0 V	5.0 V	H	H	H	5.0 V	"	5.0 V	5.0 V	H	5.0 V	H	"	5.0 V	"								
	"	25	5.0 V	GND	GND	H	H	H	GND	"	GND	GND	H	GND	H	"	5.0 V	"	"							
	"	26	GND	GND	"	H	H	H	GND	"	"	GND	H	GND	H	"	GND	"	"							
	"	27	5.0 V	5.0 V	"	H	H	H	5.0 V	"	"	GND	H	5.0 V	H	"	"	"	"							
	"	28	"	5.0 V	"	H	L	L	5.0 V	"	"	5.0 V	H	5.0 V	L	"	"	"	"							
	"	29	"	5.0 V	"	H	L	L	5.0 V	"	"	GND	H	5.0 V	L	"	"	"	"							
	"	30	"	GND	"	H	L	L	GND	"	"	"	H	GND	L	GND	"	"	"							
	"	31	"	"	"	L	L	H	"	"	"	"	L	"	H	5.0 V	"	"	"							
	"	32	GND	"	"	L	L	H	"	"	"	"	L	"	H	5.0 V	"	"	"							
	"	33	GND	"	"	L	L	H	"	"	"	"	L	"	H	GND	"	"	"							
	"	34	GND	"	"	L	H	L	"	"	"	"	H	"	L	5.0 V	"	"	"							
	"	35	5.0 V	"	"	L	H	L	"	"	"	"	H	"	L	5.0 V	"	"	"							
	"	36	"	"	"	L	H	L	"	"	"	"	H	"	L	GND	"	"	"							
	"	37	"	"	"	H	L	L	"	"	"	"	L	"	H	5.0 V	"	"	"							
	"	38	"	"	"	H	H	H	"	"	"	"	H	"	H	5.0 V	5.0 V	"	"							
	"	39	"	"	"	H	H	H	"	"	"	"	H	"	H	5.0 V	GND	"	"							
	"	40	"	5.0 V	5.0 V	H	H	H	"	"	5.0 V	"	H	"	H	GND	"	"	"							
	"	41	"	5.0 V	5.0 V	L	L	H	"	"	5.0 V	5.0 V	L	"	H	"	"	"	"							
	"	42	"	5.0 V	5.0 V	L	L	H	"	"	5.0 V	GND	L	"	H	"	"	"	"							
	"	43	"	GND	GND	L	L	H	5.0 V	"	GND	GND	L	5.0 V	H	"	"	"	"							
	"	44	"	"	"	H	H	L	"	"	"	5.0 V	H	"	L	"	"	"	"							
	"	45	"	"	"	H	H	L	"	"	"	GND	H	"	L	"	"	"	"							
	"	46	"	"	"	H	H	L	"	"	"	5.0 V	H	"	L	"	"	"	"							
	"	47	"	"	"	H	H	L	"	"	"	5.0 V	H	"	L	5.0 V	"	"	"							
	"	48	"	"	"	H	H	L	"	"	"	GND	H	"	L	5.0 V	"	"	"							
	"	49	GND	5.0 V	5.0 V	H	H	L	GND	"	5.0 V	GND	H	GND	L	GND	"	"	"							
	"	50	"	"	"	L	L	H	"	"	"	5.0 V	L	"	H	"	"	"	"							
	"	51	"	"	"	L	L	H	"	"	"	GND	L	"	H	"	"	"	"							
	"	52	"	"	"	L	L	H	"	"	"	5.0 V	L	"	H	"	"	"	"							
	"	53	"	"	"	L	L	H	"	"	"	5.0 V	L	"	H	5.0 V	"	"	"							
	"	54	"	"	"	L	L	H	"	"	"	GND	L	"	H	5.0 V	"	"	"							
	"	55	5.0 V	GND	"	L	H	H	"	"	"	5.0 V	L	"	H	GND	"	"	"							
	"	56	"	GND	"	L	H	H	"	"	"	GND	L	"	H	GND	"	"	"							
	"	57	"	GND	"	H	L	H	"	"	"	GND	H	"	L	5.0 V	"	"	"							
	"	58	"	5.0 V	GND	H	L	H	"	"	"	5.0 V	L	"	H	GND	"	"	"							
	"	59	"	5.0 V	GND	H	L	H	"	"	"	5.0 V	L	"	H	5.0 V	"	"	"							
	"	60	"	5.0 V	GND	H	L	H	"	"	"	GND	L	"	H	5.0 V	"	"	"							
	"	61	GND	"	"	H	H	H	"	"	"	"	H	"	H	5.0 V	5.0 V	"	"							
	"	62	"	"	"	H	H	H	"	"	"	"	H	"	H	GND	"	"	"							
	"	63	"	"	"	H	H	H	"	"	"	"	H	"	H	5.0 V	"	"	"							
	"	64	"	"	"	H	H	H	"	"	"	"	H	"	H	GND	"	"	"							
	"	65	"	"	"	H	H	H	"	"	"	"	H	"	H	5.0 V	"	"	"							

See footnotes at end of device type 55.

TABLE III. Group A inspection for device type 52 - Continued.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions																Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 9 T_C = 25°C		Subgroup 10 T_C = 125°C		Subgroup 11 T_C = -55°C		
		Test no.	DATA	JAM 1	JAM 2	Q2	Q1	Q3	JAM 3	V_{SS}	JAM 4	PRESET ENABLE	Q_4	JAM 5	Q_5	CLOCK	RESET	V_{DD}		Min	Max	Min	Max	Min	Max	
t_{PHL1} 6/	3003	66	IN	GND	GND	OUT	OUT	OUT	GND	GND	GND	GND	OUT	GND	OUT	IN	GND	5.0 V	CLOCK TO OUTPUT	13	700	18	980	13	700	ns
t_{PHL1}	"	67	"	"	"				"	"	"	"		"		"	"	"		13	700	18	980	13	700	"
t_{PLH1}	"	68	"	"	"	OUT	OUT	OUT	"	"	"	"	OUT	"	OUT	"	"	"	CLOCK TO OUTPUT	13	700	18	980	13	700	"
t_{PLH1}	"	69	"	"	"				"	"	"	"		"		"	"	"		13	700	18	980	13	700	"
t_{PLH2}	"	70	"	"	"	OUT	OUT	OUT	"	"	"	"	OUT	"	OUT	"	IN	"	RESET TO OUTPUT	13	700	18	980	13	700	"
t_{PLH2}	"	71	"	"	"				"	"	"	"		"		"	IN	"		13	700	18	980	13	700	"
t_{THL}	3004	72	"	"	"	OUT	OUT	OUT	"	"	"	"	OUT	"	OUT	"	GND	"	OUTPUT	10	250	14	350	10	250	"
t_{THL}	"	73	"	"	"				"	"	"	"		"		"	"	"		10	250	14	350	10	250	"
t_{TLH}	"	74	"	"	"	OUT	OUT	OUT	"	"	"	"	OUT	"	OUT	IN	GND	"	OUTPUT OUTPUT	10	250	14	350	10	250	"
t_{TLH}	"	75	"	"	"				"	"	"	"		"		"	"	"		10	250	14	350	10	250	"
t_{SHL1} 6/		76	"	"	"	"	"	"	"	"	"	IN	"	"	OUT	"	"	"	PRESET TO CLOCK		400		560		400	"
t_{SHL2}		77	"	"	"	"	"	"	"	"	"	GND	"	"	"	"	IN	"	RESET TO CLOCK		400		560		400	"
t_{SHL3}		78	"	"	"		"		"	"	"	GND		"	"	"	GND	"	DATA TO CLOCK		200		280		200	"
t_{SLH}		79	"	"	"		"		"	"	"	GND		"	"	"	GND	"	DATA TO CLOCK		200		280		200	"

See footnotes at end of device type 55.

TABLE III. Group A inspection for device type 53.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions 1/																Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_C = 25°C		Subgroup 2 T_C = 125°C		Subgroup 3 T_C = -55°C		
		Test no.	Q_{12}	Q_{13}	Q_{14}	Q_6	Q_5	Q_7	Q_4	V_{SS}	Q_1	CLOCK	RESET	Q_9	Q_8	Q_{10}	Q_{11}	V_{DD}		Min	Max	Min	Max	Min	Max	
V_{IC} (POS)		1										1 mA	1 mA					GND	EACH INPUT		1.5					V
V_{IC} 2/ (NEG)		2								GND		-1 mA	-1 mA						EACH INPUT		-6					V
I_{IL1}	3009	3								"		GND	GND					18.0 V	ALL INPUTS TOGETHER		-2.0					mA
I_{IL2}	3009	4								"		GND	GND					"	EACH INPUT		-1.0		-45.0			"
I_{IH1}	3010	5								"		18.0 V	18.0 V					"	ALL INPUTS TOGETHER		2.0					"
I_{IH2}	3010	6								"		18.0 V	18.0 V					"	EACH INPUT		1.0		45.0			"
I_{OL}		7	4/	4/	4/	4/	4/	4/	4/	"	4/	4/	4/	4/	4/	4/	4/	4/	EACH OUTPUT	4/	4/	4/	4/	4/	4/	"
I_{OH}		8	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	mA
V_{OL}	3007	9	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	V
V_{OH}	3006	10	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
V_{IL}		11	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	EACH INPUT	"	"	"	"	"	"	"
V_{IH}		12	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	EACH INPUT	"	"	"	"	"	"	"
I_{SS} 5/	3005	13								"		GND	18.0 V					18.0 V	V_{SS}		-1.0		-10.0			μA
	"	14								"		GND	GND					"	V_{SS}		"		"			"
	"	15								"		PU	"					"	None		"		"			"
	"	16								"		GND	"					"	V_{SS}		"		"			"
	"	17								"		PU	"					"	None		"		"			"
	"	18								"		18.0 V	"					"	V_{SS}		"		"			"
																				Subgroup 4 T_C = 25°C						
																				Min	Max					
C_I 3/		19								GND		IN	IN					GND	EACH INPUT		12					pF

4/

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See footnotes at end of device type 55.

TABLE III. Group A inspection for device type 53 - Continued.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions																Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 7 T_C = 25°C		Subgroup 8 T_C = 125°C		Subgroup 8 T_C = -55°C		
		Test no.	Q_{12}	Q_{13}	Q_{14}	Q_5	Q_5	Q_7	Q_4	V_{SS}	Q_1	CLOCK	RESET	Q_9	Q_8	Q_{10}	Q_{11}	V_{DD}		Min	Max	Min	Max	Min	Max	
Truth table test	3014	20	L	L	L	L	L	L	L	GND	L	GND	5.0 V	L	L	L	L	5.0 V	EACH OUTPUT							
	"	21	L	L	L	L	L	L	L	"	L	GND	GND	L	L	L	L	"								
	"	22	L	L	L	L	L	L	L	"	L	5.0 V	"	L	L	L	L	"	"							
	"	23	L	L	L	L	L	L	L	"	H	GND	"	L		L	L	"	"							
	"	24	L	L	L	L	L	L	L	"	H	5.0 V	"	L	L	L	L	"	"							
	"	25	L	L	L	L	L	L	L	"	L	GND	"	L	L	L	L	"	"							
	"	26	X	X	X	X	X	X	X	"	X	PE	"	X	X	X	X	"	"							
	"	27	L	L	L	L	L	L	L	"	H	5.0 V	"	L	L	L	L	"	"							
	"	28	L	L	L	L	L	L	H	"	L	GND	"	L	L	L	L	"	"							
	"	29	X	X	X	X	X	X	X	"	X	PF	"	X	X	X	X	"	"							
	"	30	L	L	L	L	L	L	H	"	H	5.0 V	"	L	L	L	L	"	"							
	"	31	L	L	L	L	H	L	L	"	L	GND	"	L	L	L	L	"	"							
	"	32	X	X	X	X	X	X	X	"	X	PG	"	X	X	X	X	"	"							
	"	33	L	L	L	L	H	L	H	"	H	5.0 V	"	L	L	L	L	"	"							
	"	34	L	L	L	H	L	L	L	"	L	GND	"	L	L	L	L	"	"							
	"	35	X	X	X	X	X	X	X	"	X	PH	"	X	X	X	X	"	"							
	"	36	L	L	L	H	H	L	H	"	H	5.0 V	"	L	L	L	L	"	"							
	"	37	L	L	L	L	L	H	L	"	L	GND	"	L	L	L	L	"	"							
	"	38	X	X	X	X	X	X	X	"	X	PJ	"	X	X	X	X	"	"							
	"	39	L	L	L	H	H	H	H	"	H	5.0 V	"	L	L	L	L	"	"							
	"	40	L	L	L	L	L	L	L	"	L	GND	"	L	H	H	L	"	"							
	"	41	X	X	X	X	X	X	X	"	X	PL	"	X	X	X	X	"	"							
	"	42	L	L	L	H	H	H	H	"	H	5.0 V	"	L	H	L	L	"	"							
	"	43	L	L	L	L	L	L	L	"	L	GND	"	H	L	L	L	"	"							
	"	44	X	X	X	X	X	X	X	"	X	PM	"	X	X	X	X	"	"							
	"	45	L	L	L	H	H	H	H	"	H	5.0 V	"	H	H	L	L	"	"							
	"	46	L	L	L	L	L	L	L	"	L	GND	"	L	L	H	L	"	"							
	"	47	X	X	X	X	X	X	X	"	X	PN	"	X	X	X	X	"	"							
	"	48	L	L	L	H	H	H	H	"	H	5.0 V	"	H	H	H	L	"	"							
	"	49	L	L	L	L	L	L	L	"	L	GND	"	L	L	L	H	"	"							
	"	50	X	X	X	X	X	X	X	"	X	PR	"	X	X	X	X	"	"							
	"	51	L	L	L	H	H	H	H	"	H	5.0 V	"	H	H	H	H	"	"							
	"	52	H	L	L	L	L	L	L	"	L	GND	"	L	L	L	L	"	"							
	"	53	X	X	X	X	X	X	X	"	X	PS	"	X	X	X	X	"	"							
	"	54	H	L	L	H	H	H	H	"	H	5.0 V	"	H	H	H	H	"	"							
	"	55	L	H	L	L	L	L	L	"	L	GND	"	L	L	L	L	"	"							
	"	56	X	X	X	X	X	X	X	"	X	PT	"	X	X	X	X	"	"							
	"	57	H	H	L	H	H	H	H	"	H	5.0 V	"	H	H	H	H	"	"							
	"	58	L	L	H	L	L	L	L	"	L	GND	"	L	L	L	L	"	"							
	"	59	X	X	X	X	X	X	X	"	X	PV	"	X	X	X	X	"	"							
	"	60	H	H	H	H	H	H	H	"	H	5.0 V	"	H	H	H	H	"	"							
	"	61	L	L	L	L	L	L	L	"	L	GND	"	L	L	L	L	"	"							
	"	62	X	X	X	X	X	X	X	"	X	PY	"	X	X	X	X	"	"							
	"	63	H	L	H	H	L	L	H	"	L	GND	"	L	H	H	L	"	"							
	"	64	L	L	L	L	L	L	L	"	L	GND	5.0 V	L	L	L	L	"	"							
	"	65	L	L	L	L	L	L	L	"	L	GND	GND	L	L	L	L	"	"							
	"	66	X	X	X	X	X	X	X	"	X	PJ	GND	X	X	X	X	"	"							
	"	67	L	H	L	L	H	H	L	"	H	GND	GND	H	L	L	H	"	"							
	"	68	L	L	L	L	L	L	L	"	L	GND	5.0 V	L	L	L	L	"	"							
	"	69	L	L	L	L	L	L	L	"	L	GND	GND	L	L	L	L	"	"							

See footnotes at end of device type 55.

TABLE III. Group A inspection for device type 53 - Continued.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Limits Subgroup 9 T_C = 25°C Min	Max	Subgroup 10 T_C = 125°C Min	Max	Subgroup 11 T_C = -55°C Min	Max	Unit
		Test no.	Q_{12}	Q_{13}	Q_{14}	Q_6	Q_5	Q_7	Q_4	V_{SS}	Q_1	CLOCK	RESET	Q_9	Q_8	Q_{10}	Q_{11}	V_{DD}								
t_{PHL1} 6/	3003	70							OUT	GND	OUT	IN	GND					5.0 V	CLOCK TO OUTPUT	.013	0.55	.018	0.77	.013	0.55	µs
	"	71								"		"	"					"	"	.052	1.54	.072	2.15	.052	1.54	"
	"	72					OUT			"		"	"					"	"	.065	1.87	.090	2.62	.065	1.87	"
	"	73				OUT				"		"	"					"	"	.078	2.20	.108	3.08	.078	2.20	"
	"	74						OUT		"		"	"					"	"	.091	2.53	.126	3.54	.091	2.53	"
	"	75								"		"	"		OUT			"	"	.104	2.86	.144	4.00	.104	2.86	"
	"	76								"		"	"	OUT				"	"	.117	3.19	.162	4.47	.117	3.19	"
	"	77								"		"	"			OUT		"	"	.130	3.52	.180	4.93	.130	3.52	"
	"	78								"		"	"				OUT	"	"	.143	3.85	.198	5.39	.143	3.85	"
	"	79	OUT							"		"	"					"	"	.156	4.18	.216	5.85	.156	4.18	"
	"	80		OUT						"		"	"					"	"	.169	4.51	.234	6.31	.169	4.51	"
	"	81			OUT					"		"	"					"	"	.182	4.84	.252	6.78	.182	4.84	"
t_{PLH1}	"	82								"	OUT	"	"					"	"	.013	0.55	.018	0.77	.013	0.55	"
	"	83							OUT	"		"	"					"	"	.052	1.54	.072	2.15	.052	1.54	"
	"	84					OUT			"		"	"					"	"	.065	1.87	.090	2.62	.065	1.87	"
	"	85				OUT				"		"	"					"	"	.078	2.20	.108	3.08	.078	2.20	"
	"	86						OUT		"		"	"					"	"	.091	2.53	.126	3.54	.091	2.53	"
	"	87								"		"	"		OUT			"	"	.104	2.86	.144	4.00	.104	2.86	"
	"	88								"		"	"	OUT				"	"	.117	3.19	.162	4.47	.117	3.19	"
	"	89								"		"	"			OUT		"	"	.130	3.52	.180	4.93	.130	3.52	"
	"	90								"		"	"				OUT	"	"	.143	3.85	.198	5.39	.143	3.85	"
	"	91	OUT							"		"	"					"	"	.156	4.18	.216	5.85	.156	4.18	"
	"	92		OUT						"		"	"					"	"	.169	4.51	.234	6.31	.169	4.51	"
	"	93			OUT					"		"	"					"	"	.182	4.84	.252	6.78	.182	4.84	"
t_{PHL2}		94	OUT	OUT	"	OUT	OUT	OUT	OUT	"	OUT	"	IN	OUT	OUT	OUT	OUT	"	RESET TO OUTPUT	13	450	18	630	13	450	ns
t_{THL}	3004	95	"	"	"	"	"	"	"	"	"	"	GND	"	"	"	"	"	OUTPUT	10	200	14	280	10	280	ns
t_{TLH}	3004	96	"	"	"	"	"	"	"	"	"	"	GND	"	"	"	"	"	OUTPUT	10	200	14	280	10	280	ns

See footnotes at end of device type 55.

TABLE III. Group A inspection for device type 54.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions 1/																Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 1 T_C = 25°C		Subgroup 2 T_C = 125°C		Subgroup 3 T_C = -55°C		
		Test no.	1 OUT	C OUT	2 OUT	5 OUT	6 OUT	NC	3 OUT	V_{SS}	NC	7 OUT	4 OUT	CARRY OUT	CLOCK ENABLE	CLOCK	RESET	V_{DD}		Min	Max	Min	Max	Min	Max	
V_{IC} (POS)		1													1 mA	1 mA	1 mA	GND	EACH INPUT		1.5					V
V_{IC} (NEG)		2								GND					-1 mA	-1 mA	-1 mA		EACH INPUT		-6.0					V
I_{IL1} 2/	3009	3								"					GND	GND	GND	18.0 V	ALL INPUTS TOGETHER		-3.0					nA
I_{IL2}	3009	4								"					GND	GND	GND	"	EACH INPUT		-1.0		-15.0			"
I_{IH1}	3010	5								"					18.0 V	18.0 V	18.0 V	"	ALL INPUTS TOGETHER		3.0					"
I_{IH2}	3010	6								"					18.0 V	18.0 V	18.0 V	"	EACH INPUT		1.0		15.0			"
I_{OL}		7	4/	4/	4/	4/	4/	4/	4/	"	4/	4/	4/	4/	4/	4/	4/	4/	EACH OUTPUT	4/	4/	4/	4/	4/	4/	mA
I_{OH}		8	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	mA
V_{OL}	3007	9	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	V
V_{OH}	3006	10	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
V_{IL}		11	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	EACH INPUT	"	"	"	"	"	"	"
V_{IH}		12	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	EACH INPUT	"	"	"	"	"	"	"
I_{SS} 5/	3005	13								"					GND	GND	18.0 V	18.0 V	V_{SS}		-0.5		-5.0			mA
	"	14								"					"	GND	GND	"	V_{SS}		"		"			"
	"	15								"					"	18.0 V	"	"	None		"		"			"
	"	16								"					"	GND	"	"	V_{SS}		"		"			"
	"	17								"					"	18.0 V	"	"	None		"		"			"
	"	18								"					"	GND	"	"	V_{SS}		"		"			"
	"	19								"					"	18.0 V	"	"	None		"		"			"
	"	20								"					"	GND	"	"	V_{SS}		"		"			"
	"	21								"					"	18.0 V	"	"	V_{SS}		"		"			"
	"	22								"					"	GND	"	"	None		"		"			"
	"	23								"					"	18.0 V	"	"	V_{SS}		"		"			"
	"	24								"					"	GND	"	"	None		"		"			"
	"	25								"					"	18.0 V	"	"	V_{SS}		"		"			"
	"	26								"					"	GND	"	"	None		"		"			"
	"	27								"					"	18.0 V	"	"	V_{SS}		"		"			"
	"	28								"					18.0 V	18.0 V	"	"	V_{SS}		"		"			"

See footnotes at end of device type 55.

TABLE III. Group A inspection for device type 54 - Continued.

Symbol	MIL-STD-883 method	Cases E, F, Z, N	Terminal conditions																Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Subgroup 4 T_C = 25°C						
		Test no.	1 OUT	0 OUT	2 OUT	5 OUT	6 OUT	NC	3 OUT	V_{SS}	NC	7 OUT	4 OUT	CARRY OUT	CLOCK ENABLE	CLOCK	RESET	V_{DD}		Min	Max	Min	Max	Min	Max	
C_I 3/	3012	29								GND					IN	IN	IN	GND	EACH INPUT		12					pF
																				Subgroup 7 T_C = 25°C		Subgroup 8 T_C = 125°C		Subgroup 8 T_C = -55°C		
																				Min	Max	Min	Max	Min	Max	
Truth table test 5/	3014	30	L	H	L	L	L		L	GND		L	L	H	GND	5.0 V	5.0 V	5.0 V	EACH OUTPUT							
	"	31	L	H	L	L	L		L	"		L	L	H	"	5.0 V	GND	"	"							
	"	32	H	L	L	L	L		L	"		L	L	H	"	PA	"	"	"							
	"	33	L	L	H	L	L		L	"		L	L	H	"	"	"	"	"							
	"	34	L	L	L	L	L		H	"		L	L	H	"	"	"	"	"							
	"	35	L	L	L	L	L		L	"		L	H	L	"	"	"	"	"							
	"	36	L	L	L	H	L		L	"		L	L	L	"	"	"	"	"							
	"	37	L	L	L	L	H		L	"		L	L	L	"	"	"	"	"							
	"	38	L	L	L	L	L		L	"		H	L	L	"	"	"	"	"							
	"	39	L	H	L	L	L		L	"		L	L	H	"	"	"	"	"							
	"	40	H	L	L	L	L		L	"		L	L	H	"	"	"	"	"							
	"	41	H	L	L	L	L		L	"		L	L	H	5.0 V	5.0 V	"	"	"							
	"	42	H	L	L	L	L		L	"		L	L	H	5.0 V	GND	"	"	"							
	"	43	H	L	L	L	L		L	"		L	L	H	5.0 V	5.0 V	"	"	"							
	"	44	L	L	H	L	L		L	"		L	L	H	GND	5.0 V	"	"	"							
	"	45	X	X	X	X	X		X	"		X	X	X	"	PB	"	"	"							
	"	46	L	L	L	L	L		L	"		L	H	L	"	5.0 V	"	"	"							
	"	47	L	L	L	L	L		L	"		L	H	L	"	GND	"	"	"							
	"	48	L	H	L	L	L		L	"		L	L	H	"	GND	5.0 V	"	"							
	"	49	L	H	L	L	L		L	"		L	L	H	"	GND	GND	"	"							
	"	50	H	L	L	L	L		L	"		L	L	H	"	5.0 V	"	"	"							
	"	51	X	X	X	X	X		X	"		X	X	X	"	PC	"	"	"							
	"	52	L	L	L	L	L		L	"		L	H	L	"	5.0 V	"	"	"							
	"	53	L	H	L	L	L		L	"		L	L	H	"	5.0 V	5.0 V	"	"							
	"	54	L	H	L	L	L		L	"		L	L	H	"	5.0 V	GND	"	"							
																				Subgroup 9 T_C = 25°C		Subgroup 10 T_C = 125°C		Subgroup 11 T_C = -55°C		
																				Min	Max	Min	Max	Min	Max	
t_{PHL1} 6/ t_{PHL1}	3003 "	55 56	OUT	OUT	OUT	OUT	OUT		OUT	GND "		OUT	OUT	OUT	GND "	IN "	GND	5.0 V "	CLOCK TO OUTPUT	.013 .013	.829 1.00	.018 .018	1.16 1.40	.013 .013	.829 1.00	µs "
t_{PLH1} t_{PLH1}	" "	57 58	OUT	OUT	OUT	OUT	OUT		OUT	"		OUT	OUT	OUT	" "	" "	GND	"	CLOCK TO OUTPUT	.013 .013	.829 1.00	.018 .018	1.16 1.40	.013 .013	.829 1.00	" "
t_{PLH2} t_{PLH2}	" "	59 60		OUT						"				OUT	" "	" "	IN "	"	RESET TO OUTPUT	.013 .013	1.00 0.80	.018 .018	1.40 1.12	.013 .013	1.00 0.80	" "
t_{PHL2}	"	61	OUT		OUT	OUT	OUT		OUT	"		OUT	OUT		"	"	"	"	RESET TO OUTPUT	.013	1.00	.18	1.40	.013	1.00	
t_{THL} t_{THL}	3004 "	62 63	OUT	OUT	OUT	OUT	OUT		OUT	"		OUT	OUT	OUT	" "	" "	GND	"	OUTPUT OUTPUT	10 10	250 200	14 14	280 280	10 10	200 200	ns ns
t_{TLH} t_{TLH}	" "	64 65	OUT	OUT	OUT	OUT	OUT		OUT	"		OUT	OUT	OUT	" "	" "	GND "	"	OUTPUT OUTPUT	10 10	360 360	14 14	504 504	10 10	360 360	ns ns
t_{SHL1} t_{SHL1}		66 67	OUT	OUT	OUT	OUT	OUT		OUT	"		OUT	OUT	OUT	IN IN	" "	" "	"	CLOCK ENABLE TO CLOCK CLOCK ENABLE TO CLOCK		250 250		350 350		250 250	ns ns
t_{SHL2}		68	OUT	OUT						"					GND	"	IN	"	RESE TO CLOCK		400		560		400	ns

See footnotes at end of device type 55.

TABLE III. Group A inspection for device type 55.

Symbol	MIL-STD-883 method	Cases A,B,C,D, T,X,Y Test no.	Terminal conditions 1/ 1 CLOCK	2 RESET	3 Q_7	4 Q_6	5 Q_5	6 Q_4	7 V_{SS}	8 NC	9 Q_3	10 NC	11 Q_2	12 Q_1	13 NC	14 V_{DD}	Measured terminal	Limits Subgroup 1 T_C = 25°C Min	Subgroup 1 T_C = 25°C Max	Subgroup 2 T_C = 125°C Min	Subgroup 2 T_C = 125°C Max	Subgroup 3 T_C = -55°C Min	Subgroup 3 T_C = -55°C Max	Unit
V_{IC} (POS)		1	1 mA	1 mA												GND	EACH INPUT		1.5					V
V_{IC} (NEG)		2	-1 mA	-1 mA					GND								EACH INPUT		-6.0					V
I_{IL} 2/	3009	3	GND	GND					"							18.0 V	CLOCK		-1.0		-45			nA
I_{IL}	3009	4	GND	GND					"							"	RESET		-1.0		-45			"
I_{IH}	3010	5	18.0 V	GND					"							"	CLOCK		1.0		45			"
I_{IH}	3010	6	GND	18.0 V					"							"	RESET		1.0		45			"
I_{OL}		7	4/	4/	4/	4/	4/	4/	"	4/	4/	4/	4/	4/	4/	4/	EACH OUTPUT	4/	4/	4/	4/	4/	4/	mA
I_{OH}		8	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	4/	4/	4/	4/	4/	4/	mA
V_{OL}	3007	9	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	V
V_{OH}	3006	10	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
V_{IL}		11	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	EACH INPUT	"	"	"	"	"	"	"
V_{IH}		12	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	EACH INPUT	"	"	"	"	"	"	"
I_{SS} 5/	3005	13	GND	18.0 V					"							18.0 V	V_{SS}		-0.5		-5.0			µA
	"	14	GND	GND					"							"	V_{SS}		"		"			"
	"	15	PI	"					"							"	None		"		"			"
	"	16	18.0 V	"					"							"	V_{SS}		"		"			"
	"	17	GND	"					"							"	None		"		"			"
	"	18	PI	"					"							"	None		"		"			"
	"	19	GND	"					"							"	V_{SS}		"		"			"
																		Subgroup 4 T_C = 25°C Min	Subgroup 4 T_C = 25°C Max					
C_i 3/	3002	20	IN	IN					GND							GND	EACH INPUT		12					pF

See footnotes at end of device type 55.

TABLE III. Group A inspection for device type 55 - Continued.

Symbol	MIL-STD-883 method	Cases A,B,C,D T,X,Y	Terminal conditions														Measured terminal	Limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Subgroup 7 T_C = 25°C		Subgroup 8 T_C = 125°C		T_C = -55°C		
		Test no.	CLOCK	RESET	Q_7	Q_6	Q_5	Q_4	V_{SS}	NC	Q_3	NC	Q_2	Q_1	NC	V_{DD}		Min	Max	Min	Max	Min	Max	
Truth table test 5/	3014	21	GND	5.0 V	L	L	L	L	GND		L		L	L		5.0 V	EACH OUTPUT							
	"	22	GND	GND	L	L	L	L	"		L		L	L		"								
	"	23	5.0 V	"	L	L	L	L	"		L		L	L		"								
	"	24	GND	"	L	L	L	L	"		L		L	H		"								
	"	25	5.0 V	"	L	L	L	L	"		L		L	H		"								
	"	26	GND	"	L	L	L	L	"		L		H			"								
	"	27	5.0 V	"	L	L	L	L	"		L		H	L		"								
	"	28	GND	"	L	L	L	L	"		L		H	H		"								
	"	29	5.0 V	"	L	L	L	L	"		L		H	H		"								
	"	30	GND	"	L	L	L	L	"		H		L	L		"								
	"	31	PC	"	X	X	X	X	"		X		X	X		"								
	"	32	5.0 V	"	L	L	L	L	"		H		H	H		"								
	"	33	GND	"	L	L	L	H	"		L		L	L		"								
	"	34	PF	"	X	X	X	X	"		X		X	X		"								
	"	35	5.0 V	"	L	L	L	H	"		H		H	H		"								
	"	36	GND	"	L	L	H	L	"		L		L	L		"								
	"	37	PG	"	X	X	X	X	"		X		X	X		"								
	"	38	5.0 V	"	L	L	H	H	"		H		H	H		"								
	"	39	GND	"	L	H	L	L	"		L		L	L		"								
	"	40	PH	"	X	X	X	X	"		X		X	X		"								
	"	41	5.0 V	"	L	H	H	H	"		H		H	H		"								
	"	42	GND	"	H	L	L	L	"		L		L	L		"								
	"	43	PJ	"	X	X	X	X	"		X		X	X		"								
	"	44	5.0 V	"	H	H	H	H	"		H		H	H		"								
	"	45	GND	"	L	L	L	L	"		L		L	L		"								
	"	46	PI	"	X	X	X	X	"		X		X	X		"								
	"	47	GND	"	L	H	L	H	"		L		H	L		"								
	"	48	GND	5.0 V	L	L	L	L	"		L		L	L		"								
	"	49	GND	GND	L	L	L	L	"		L		L	L		"								
	"	50	PK	GND	X	X	X	X	"		X		X	X		"								
	"	51	GND	GND	H	L	H	L	"		H		L	H		"								
	"	52	GND	5.0 V	L	L	L	L	"		L		L	L		"								
	"	53	GND	GND	L	L	L	L	"		L		L	L		"								
																		Subgroup 9 T_C = 25°C		Subgroup 10 T_C = 125°C		Subgroup 11 T_C = -55°C		
																		Min	Max	Min	Max	Min	Max	
t_{PHL1} 6/	3003	54	IN	GND					GND					OUT		5.0 V	CLOCK TO OUTPUT	.013	0.35	.018	0.49	.013	0.35	ns
	"	55	"	"					"				OUT			"		.026	0.55	.036	0.77	.026	0.55	"
	"	56	"	"					"		OUT					"		.039	0.75	.054	1.05	.039	0.75	"
	"	57	"	"				OUT	"							"		.052	0.95	.072	1.33	.052	0.95	"
	"	58	"	"			OUT		"							"		.065	1.15	.090	1.61	.065	1.15	"
	"	59	"	"		OUT			"							"		.078	1.35	.108	1.89	.078	1.35	"
	"	60	"	"	OUT				"							"		.091	1.55	.126	2.17	.091	1.55	"
t_{PLH1}	"	61	"	"					"					OUT		"		.013	0.35	.018	0.49	.013	0.35	"
	"	62	"	"					"				OUT			"		.026	0.55	.036	0.77	.026	0.55	"
	"	63	"	"					"		OUT					"		.039	0.75	.054	1.05	.039	0.75	"
	"	64	"	"				OUT	"							"		.052	0.95	.072	1.33	.052	0.95	"
	"	65	"	"			OUT		"							"		.065	1.15	.090	1.61	.065	1.15	"
	"	66	"	"		OUT			"							"		.078	1.35	.108	1.89	.078	1.35	"
	"	67	"	"	OUT				"							"		.091	1.55	.126	2.17	.091	1.55	"
t_{PHL2}		68	"	IN	OUT	OUT	OUT	OUT	"		OUT		OUT	OUT		"	RESET TO OUTPUT	13	350	18	490	13	350	ns
t_{THL}	3004	69	"	GND	"	"	"	"	"		"		"	"		"	OUTPUT	10	200	14	280	10	200	ns
t_{TLH}	3004	70	"	GND	"	"	"	"	"		"		"	"		"	OUTPUT	10	200	14	280	10	200	ns

See footnotes at end of device type 55.

1/ Pins not designated may be high-level logic, low-level logic, or open. Exceptions are as follows:

a. $V_{IC(POS)}$ tests, the V_{SS} terminal shall be open.

b. $V_{IC(NEG)}$ tests, the V_{DD} terminal shall be open.

c. I_{SS} tests, the output terminal shall be open.

2/ The device manufacturer may at his option measure I_{IL} and I_{IH} at 25°C for each individual input or measure all inputs together.

3/ See 4.4.1c for C_i measurement.

4/ Procedures for input/output tests of the device parameters specified below are described in figures 6, 7, 8, and . Included with the specified parameters are test conditions and test limits at three temperatures. These tests shall be performed at each specified V_{DD} voltage at the specified conditions. V_{IL}/V_{IH} test maybe performed as final attributes data.

Symbol	Parameter	V_{DD} (V dc)	Conditions	Limits T_C = -55°C Min	Max	T_C = 25°C Min	Max	T_C = 125°C Min	Max	Unit
V_{OL}	Low-level output voltage	15	$V_I = V_{SS}$ or V_{DD} $\|I_O\| < 1$ µA		0.05		0.05		0.05	V
V_{OH}	High-level output voltage	15	$V_I = V_{SS}$ or V_{DD} $\|I_O\| < 1$ µA	14.95		14.95		14.95		V
V_{IL}	Input low voltage	5 10 15	V_O = 0.5 V or 4.5 V V_O = 1.0 V or 9.0 V V_O = 1.5 V or 11.5 V $\|I_O\| < 1$ µA	1.5 3.0 4.0		1.5 3.0 4.0		1.5 3.0 4.0		V
V_{IH}	Input high voltage	5 10 15	V_O = 0.5 V or 4.5 V V_O = 1.0 V or 9.0 V V_O = 1.5 V or 11.5 V $\|I_O\| < 1$ µA		3.5 7.0 11.0		3.5 7.0 11.0		3.5 7.0 11.0	V
I_{OL}	Output low (sink) current	5	V_O = 0.4 V, V_I = 0 or 5 V	0.64		0.51		0.36		mA
		15	V_O = 1.5 V, V_I = 0 or 15 V	4.2		3.4		2.4		
I_{OH}	Output high (source) current	5	V_O = 4.6 V, V_I = 0 or 5 V	-0.64		-0.51		-0.36		mA
		15	V_O = 13.5 V, V_I = 0 or 15 V	-4.2		-3.4		-2.4		

5/ This I_{SS} and truth table tests shall be performed in the test number sequence shown with no intervening changes to terminal conditions. The truth table test shall be performed with V_{IH} and V_{DD} ≤5.0 V and ≥18.0 V. Table III shows the lower of these two voltages. During the functional test, input terminals designated "PA", "PB", etc., shall have applied thereto a specified number of single pulses with the following parameters: Pulse amplitude = V_{DD} maximum to V_{DD} = 4% minimum. These pulses are enumerated as follows:

Symbol	Pulses	Symbol	Pulses	Symbol	Pulses	Symbol	Pulses
PA	1	PF	7	PK	85	PS	2047
PB	2	PG	15	PL	127	PT	4095
PC	3	PH	31	PM	255	PU	5461
PD	4	PI	42	PN	511	PV	8191
PE	5	PJ	63	PR	1023	PY	10922

Also during the truth table tests, device output voltages are: don't care "X", high "H", and low "L" as specified in the terminal conditions columns. The output voltage limits over the specified temperature range are "H" = V_{DD} -0.50 V minimum and "L" = V_{SS} +0.50 V maximum.

6/ See figure 10 for switching time waveforms and test circuit.

7/ Data pin need only be toggled high or low to allow outputs to achieve the proper setup state required to verify the indicated test parameter.

4.3.1 Qualification extension. When authorized by the qualifying activity, for qualification inspection, if a manufacturer qualifies to a 51-55 device type which is manufacturered identically to a 01-05 device type of this specification, then the 01-05 device type may be part I qualified by conducting only worse case group A electrical tests and any electrical tests specified and by submitting data in accordance with MIL-M-38510, appendix D (i.e. groups A, B, C, D, and E tests are not required).

4.4 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-M-38510 and as specified herein. Inspections to be performed shall be those specified in method 5005 of MIL-STD-883 and herein for groups A, B, C, D and E inspections (see 4.4.1 through 4.4.5).

4.4.1 Group A inspection. Group A inspection shall be in accordance with table I of method 5005 of MIL-STD-883 and as follows:

a. Tests shall be performed in accordance with table II herein.

b. Subgroups 5, 6, and 8 of table I of method 5005 of MIL STD 883 shall be omitted.

c. Subgroup 4 (C_i measurement) shall be measured only for initial qualification and after process or design changes which may affect input capacitance. Capacitance shall be measured between the designated terminal and V_{SS} at a frequency of 1 MHz.

d. Subgroup 12 shall be added to the group A inspection requirements for class S devices using an LTPD of 15 and consist of the procedures, test conditions, and limits specified in table III.

e. Subgroups 9 and 11 shall be measured only for initial qualification and after process or design changes which may affect dynamic performance.

f. At the manufacturers option, test tapes may be programmed simultaneously for each identical section provided that each output is measured and each specified input combination is tested.

g. When the 01 through 05 device types are qualified by extension (see 4.3.1), these device types will be inspected (QCI) according to the 51 through 55 device type requirements, respectively.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II of method 5005 of MIL-STD-883 and as follows:

a. Class S steady state life (accelerated) test circuits shall be submitted to the qualifying activity for approval. When the alternate steady state life test is used, the circuit of figure 5, or equivalent, shall be used.

b. A special subgroup shall be added using an LTPD of 15 for classes S and B, and shall be performed on each inspection lot for initially qualified device types 01-05, and measured only for initial qualification and after process or design changes for initially qualified device types 51-55. This subgroup shall consist of a high voltage test of the input protection circuits V_{ZAP} (see 4.5.3).

c. End point electrical parameters shall be as specified in table II herein and shall consist of those subgroups specified in table IIa of test method 5005 of MIL-STD-883, and table II herein. Delta limits shall apply only to subgroup 5 of group B inspection and shall consist of tests specified in table IV herein.

4.4.3 Group C inspection. Group C inspection shall be in accordance with table/III of method 5005 of MIL-STD-883 and as follows:

a. End-point electrical parameters shall be as specified in table II herein. Delta limits shall apply only to subgroup 1 of group C inspection, and shall consist of tests specified in table IV herein.

b. Steady state life test (method 1005 of MIL-STD-883) conditions.

(1) Test condition D and as specified in 4.5.2 and as shown on figure 5, or equivalent.

(2) T_A = 125°C minimum.

(3) Test duration, 1,000 hours, except as permitted by appendix B of MIL-M-38510 and method 1005 of MIL-STD-883.

c. When the 01 through 05 device types are qualified by extension (see 4.3.1), these device types will be inspected (QCI) according to the 51 through 55 device type requirements, respectively.

4.4.4 Group D inspection. Group D inspection shall be in accordance with table IV of method 5005 of MIL-STD-883. End-point electrical parameters shall be as specified in table II herein.

4.4.5 Group E inspection. Group E inspection is required only for device types intended to be marked as radiation hardened (see 3.6.1). When group E testing is performed it shall be in accordance with table V of method 5005 of MIL-STD-883 and 4.5.5 herein. When group E inspection is performed for class S devices, the total dose radiation shall be included as an additional test in the wafer lot acceptance of method 5007 of MIL-STD-883.

4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows.

4.5.1 Voltage and current. All voltages given are referenced to the microcircuit V_{SS} terminal, unless otherwise specified. Currents given are conventional current and positive when flowing into the referenced terminal.

4.5.2 Burn-in and life test cooldown procedures. Burn-in and life tests cooldown procedures shall be in accordance with MIL-STD-883, method 1005 and 1015.

TABLE IV. Delta limits at 25°C.

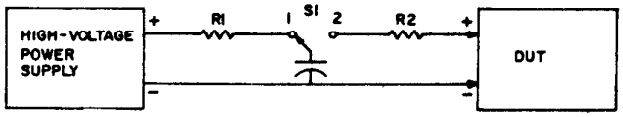
Parameter	V_{DD}	Device types				
		01	02	03	04	05
I_{SS}	15 V	±125 nA	±125 nA	±250 nA	±125 nA	±125 nA
V_{OL1}	5 V	±.04 V	±.04 V	±.04 V	±.04 V	±.04 V
V_{OH1}	5 V	±.08 V	±.08 V	±.08 V	±.08 V	±.08 V

Parameter	V_{DD}	Device types				
		51	52	53	54	55
I_{SS}	18 V	±125 nA	±125 nA	±250 nA	±125 nA	±125 nA
I_{OL}	5 V	±15%	±15%	±15%	±15%	±15%
I_{OH}	5 V	±15%	±15%	±15%	±15%	±15%

1/ Each of the above parameters shall be recorded before and after the required burn-in and life tests to determine delta's (Δ).

4.5.3 High voltage (V_{ZAP}) test of input protection circuits. All input terminals (up to a maximum of 4) of the devices under test (DUT) shall be subjected to a voltage pulse from a 100 pF source charged to 400 V. This destructive test shall be conducted as follows using the test circuit shown on figure 11.

a. Measure I_{IL} and I_{IH} at the inputs selected, as stated above, at 25°C. The test limit for each input tested shall be ±10 nA at V_{DD} maximum. Measure I_{SS} on device under test (DUT) at 25°C. The test limit for this measurement shall be increased by a maximum of 20 percent of the specified I_{SS} table III limit at V_{DD} maximum.



NOTES:
1. V_{ZAP} = 400 V minimum charge on C1.
2. 1 MΩ ≤ R1 ≤ 50 MΩ.
3. R2 = 1.5 kΩ.
4. C1 = 100 pF.
5. S1 = Hg-wetted "bounceless" relay.

FIGURE 11. High voltage (V_{ZAP}) test circuit.

b. V_{ZAP} is applied to DUT in the following modes (see table V) by charging C1 to V_{ZAP} with S1 in position 1 and then switching to position 2.

TABLE V. Modes for high voltage test.

Mode	+ Terminal	- Terminal
1	V_{DD}	Input
2	Input	V_{SS}

c. Within 24 hours repeat the I_{SS}, I_{IH}, and I_{IL} measurements on the same terminals as performed above. If a DUT exhibits leakage currents in excess of the specified limits after the V_{ZAP} test, it shall be classified as a failure.

4.5.4 Quiescent supply current (I_{SS}) test. When performing quiescent supply current measurements, the meter shall be placed so that all currents flow through the meter.

4.5.5 Radiation hardness assurance (RHA) testing. The RHA testing shall be performed in accordance with test procedures and sampling specified in table V of method 5005 of MIL-STD-883 and herein:

a. Before irradiation, selected samples shall be assembled in qualified packages and pass the governing electrical parameters (Group A subgroup 1 at 25°C) and also be subjected to the threshold-voltage test in table VIII in order to calculate the delta threshold (ΔV_T) after irradiation.

b. The devices shall be subjected to a total radiation dose as specified in MIL-M-38510 for the RHA level being tested, and meet the end-point electrical parameters as defined in table VI at 25°C, after exposure. The start and completion of the end point electrical parameter measurements shall not exceed 2 hours following irradiation.

c. Threshold-voltage test circuit conditions shall be as specified in table VIII and figure 12. In situ and remote testing shall be performed with the devices biased in accordance with table VII and bias may be interrupted for up to 1 minute to remove devices to the remote bias fixture.

d. After irradiation, the devices shall pass the truth table test as specified in subgroup 7 in table III or if subgroup 7 is not required then an equivalent truth table test shall be performed.

TABLE VI. Radiation hardening end-point electrical parameters at 25°C.

Parameter	Test limits (all device types)	V_{DD}	
		Device types 01,02,03,04,05	Device types 51,52.53.54,55
V_{TN}	0.3 V min	10 V	10 V
V_{TP}	2.8 V max	10 V	10 V
ΔV_T	1.4 V max	10 V	10 V
I_{SS}	100 x max limit	15 V	18 V
t_{PLH}	1.35 x max limit	5 V	5 V
t_{PHL}	1.35 x max limit	5 V	5 V

TABLE VII. Bias during exposure to radiation.

Device type	Pin connections		
	10 V dc thru a 30- to 60-kΩ resistor	V_{SS} = GND	V_{DD} = 10 V dc
01 51	13, 14, 15	8	16
02 52	1, 2, 3, 7, 9, 10, 12, 14, 15	8	16
03 53	10, 11	8	16
04 54	13, 14, 15	8	16
05 55	1, 2	7	14

Pins not designated are open, or may be tied to 10 V dc through a 30- to 60-kilohm resistor.

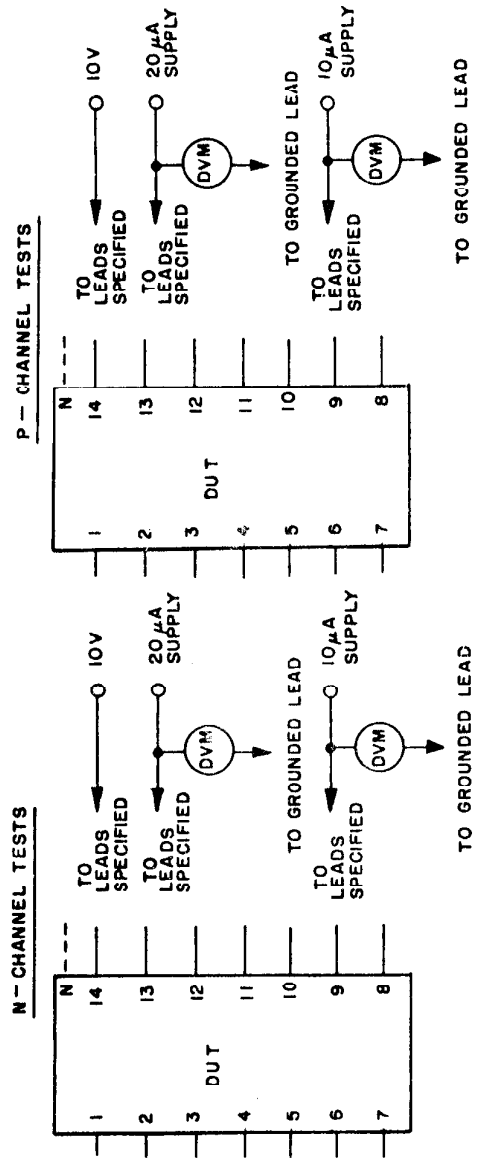


FIGURE 12. Threshold-voltage test circuit.

TABLE VIII. Threshold-voltage test conditions.

Device type	GND	10V	V_{TN} measured at				V_{TP} measured at			
			-20 μA supply	10 μA supply	GND	-10V	20 μA supply	10 μA supply
01 51	15	16	8, 13, 14		15	8	13,14,16	
02 52	15	16	1,2,3,7-10 12, 14		15	1,2,3, 7-10, 12,14	16	
03 53	11	16	8		11	8,11	16	
04 54	14	13,15, 16	8		14	8,13, 15	16	
05 55	1	14	2, 7		1	2, 7	14	

4.6 Data reporting. When specified in the purchase order or contract, a copy of the following data, as applicable, shall be supplied:

a. Attributes data for all screening tests (see 4.2) and variables data for all static burn-in, dynamic burn-in, and steady state life tests.

b. A copy of each radiograph.

c. The quality conformance inspection data (see 4.4).

d. Parameter distribution data on parameters evaluated during burn-in (see 3.5).

e. Final electrical parameters data (see 4.2d).

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

6. NOTES

6.1 Intended use. Microcircuits conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

6.2 Ordering data. The contract or purchase order shall specify the following:

a. Complete part number (see 1.2).

b. Requirements for delivery of one copy of the quality conformance inspection data pertinent to the device inspection lot to be supplied with each shipment by the device manufacturer, if applicable.

c. Requirement for certificate of compliance, if applicable.

d. Requirements for notification of change of product or process to contracting activity in addition to notification to the qualifying activity, if applicable.

e. Requirements for failure analysis (including required test condition of method 5003 of MIL-STD-883), corrective action, and reporting of results, if applicable.

f. Requirements for product assurance options.

g. Requirements for lead lengths, or lead forming, if applicable. These requirements shall not affect the part number.

h. Requirements "JAN" marking.

i. Requirement for total dose radiation testing (see 3.6.1 and 4.5.5), if applicable.

6.3 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-M-38510, MIL-STD-1331, and as follows:

V_{ZAP} - - - - - - - - - - - Input test voltage.

Ci - - - - - - - - - - - - - Input terminal-to-V_{SS} capacitance.

GND- - - - - - - - - - - - - Ground. Zero voltage potential.

T_A - - - - - - - - - - - - Free air temperature.

V_{IC}- - - - - - - - - - - Input clamp voltage.

V_{ICL} - - - - - - - - - - Clock input voltage.

V_{DD}- - - - - - - - - - - Positive supply voltage.

V_{SS}- - - - - - - - - - - Negative supply voltage.

I_{SS}- - - - - - - - - - - Quiescent supply current.

6.4 Logistic support. Unless otherwise specified, microcircuits acquired for Government logistic support shall be acquired to device class S for National Aeronautics and Space administration or class B for Department of Defense (see 1.2.2), lead finish C (see 3.3). Longer length leads and lead forming shall not affect the part number.

6.5 Substitutability. The cross-reference information below is presented for the convenience of users. Microcircuits covered by this specification will functionally replace the listed generic-industry type. Generic-industry microcircuit types may not have equivalent operational performance characteristics across military temperature ranges or reliability factors equivalent to MIL-M-38510 device types and may have slight physical variations in relation to case size. The presence of this information shall not be deemed as permitting substitution of generic-industry types for MIL-M-38510 types or as a waiver of any of the provisions of MIL-M-38510.

Military device type	Generic-industry type
01	4017A
02	4018A
03	4020A
04	4022A
05	4024A
51	4017B
52	4018B
53	4020B
54	4022B
55	4024B

6.6 Handling. MOS devices must be handled with certain precautions to avoid damage due to accumulation of static charge. Input protective devices have been designed in the chip to minimize the effect of this static buildup. However, the following handling practices are recommended:

a. Devices should be handled on benches with conductive and grounded surface.

b. Ground test equipment, tools, and operator.

c. Do not handle devices by the leads.

d. Store devices according to MIL-M-38510, paragraph 5.1.

e. Avoid use of plastic, rubber, or silk in MOS areas.

f. Maintain relative humidity above 50 percent, if practical.

6.7 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:
Army - ER
Navy - EC
Air Force - 17
NASA - NA

Review activities:
Army - AR, MI
Air Force - 11, 19, 85, 99
DLA - ES

User activities:
Army - SM
Navy - AS, CG, MC

Preparing activity:
NASA - NA

Agent:
DLA - ES

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